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SHOEMAKING

BY

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VOLUME 4

CONSTITUTING PART OF THE TRAINING COURSE
FOR RETAIL SHOE SALESMEN

RETAIL SHOE SALESMEN'S INSTITUTE
BOSTON

PREFACE

MUCH has already been written on the general subject of shoe manufacture — and this has gone far in building up a general fund of useful information on a thoroughly important topic. But, in the main, the tendency has been to present technical dicussions setting forth the facts of mechanical operation and the details of shop practice for use of the manufacturing specialist. The present volume, however, is based solely upon the requirements of the retail shoe salesman and represents the first effort made to approach the subject from such an angle. Both the information presented and the manner of its preparation are gauged to meet the special needs of the retail shoe salesman in bringing about the daily improvement of his store service.

In the early chapters of this volume some emphasis is laid upon the history and gradual advancement of the shoemaking art. This is done so that the reader may be well back-grounded in the early facts and thoroughly appreciate the importance of the more modern developments in reducing shoe manufacture to machine operations. For, in fact, it is largely due to this one feature that the present great advancement of the industry has been made possible.

In connection with all phases of modern shoemaking and related subjects, each operation and process is carefully explained and the principles made clear in the volume. But unimportant details have sometimes been purposely omitted because of their having no practical value to the retail shoe salesman as part of his service to his trade. The subject is large and has required limitation to only those facts of interest and importance to the retail footwear specialist.

Acknowledgment is made by the Editors for valuable suggestions received from William F. Bostock, Fred A. Gannon, John J. Gillespie.

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CHAPTER I

HISTORY AND ROMANCE OF THE SHOE

ANCIENT RECORDS

From the earliest records and on through the centuries even to the present day, there is no part of man's wearing apparel so sentimentally associated with the world's history and romance as the shoe. Through all time, it seems, the shoe has held its place as a thing apart, to be regarded and provided for in connection with man's every interest — his work, his play, his courtship, his warfare, his worship. The history of footwear is the history of the world's advancement.

Many centuries before our western world emerged from the darkness of its early existence, there flourished a brilliant civilization among the eastern races that inhabited the valley of the Nile in Africa and certain parts of southern Asia. The peoples who built those early empires in Egypt, India and Babylonia, gave to the world its first literature and, therefore, the oldest written records of which we have any knowledge. To these far-distant writings, therefore,

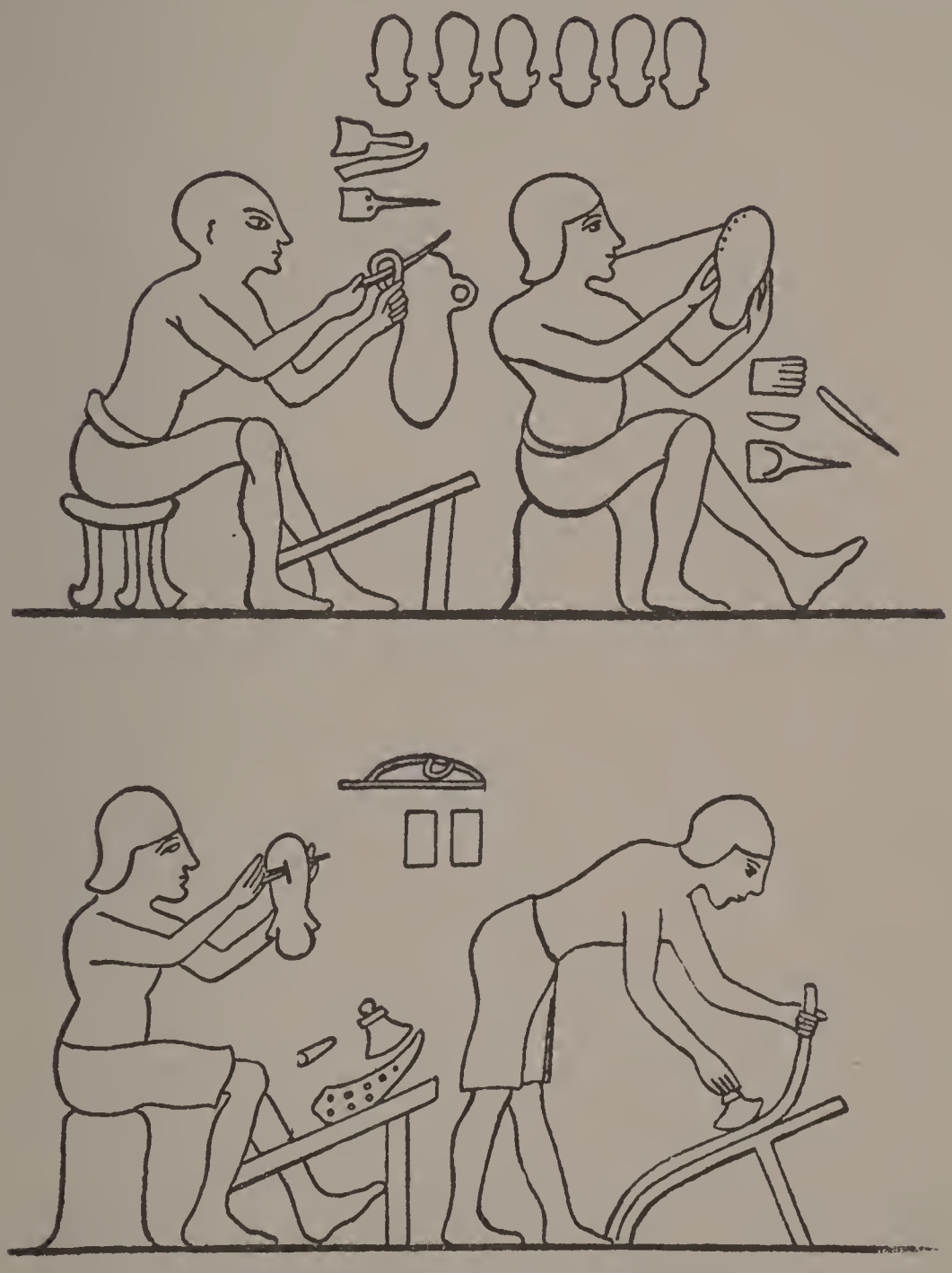
we turn quite naturally in our search for the oldest record of the shoe.

Just where the glory belongs for the most ancient usage of footwear we probably shall never know because the records that have been discovered do not tell of the beginnings of the nations. The empires appear to us as full-grown in the hazy distance of the past, and opinions differ as to the dates of their origin. Nevertheless it seems entirely probable that the shoe ranked among the very first of the articles of wearing apparel to be adopted by man.

The first mention of footwear to be found in the writings of ancient tribes occurs in a sacred Hindu composition which is known to be thousands of years old. The inscription directs all worshippers to remove their shoes during devotions at certain of the shrines. It would appear from this custom that shoes in some form were an article of every-day dress and had entered into the traditions of the people even at that early period.

SHOEMAKING AN ANCIENT ART

Other references to footwear are found at intervals in the literature of practically all of the early races, but the first record of *shoemaking* as such was discovered in Egypt in the ruins of the once mighty city of Thebes. The figures on the page following are sketches of a wall decoration that represents the interior of a san-



EGYPTIAN SANDAL MAKERS

dal-maker's shop. This interesting relic is believed to date back to a period about 1500 years before Christ.

Not only the manner of working but the tools are very clearly shown in the engraving. One worker is adjusting a narrow strip of leather or fabric at the side of a sole, through which a strap will later be passed to bind the sandal to the foot. His fellow worker is sewing on a sole and is tightening the thread with his teeth — a method that was used by shoe makers who worked on hand-turns up to a few years ago. In fact, one of the most interesting features of these engravings is the marked similarity in both the methods and implements of the ancients to those of our own old-fashioned cobblers.

The low three-legged stool, for instance, is identical with those to be seen in many little repair shops at the present time. In the second picture, notice the semi-circular knife with which the leather is being cut. It is much the same as the knife used by some leather workers of to-day. One or two of the tools are strange to us, but the others have survived through all the years until the coming of shoe machinery. The fact that the Egyptian workmanship and implements were so nearly perfected at that early period, leads us to conclude that they had been making footwear for many centuries before these pictures were made. That the craft had by that time developed into a trade of some consequence

is indicated by the rows of finished sandals ready for delivery or perhaps on display to attract the customer.

ANCIENT TYPES OF FOOTWEAR

The tropical climate of Egypt made the light, open work sandal the most popular form of foot covering. Many well-preserved specimens of sandals have been recovered from mummy cases found among the remains of the magnificent cities that once stood on the banks of the Nile. These sandals show a great variety of style and workmanship. Usually, they were made of woven palm leaves or papyrus stalks, and often of leather. One of the simplest forms is a sole of plaited papyrus which was attached to the foot by means of a strap fastened to the sole in such a way that it could pass between the great toe and its neighbor and connect with a cross piece above the instep. This type of foot covering is pictured in the following sketch.

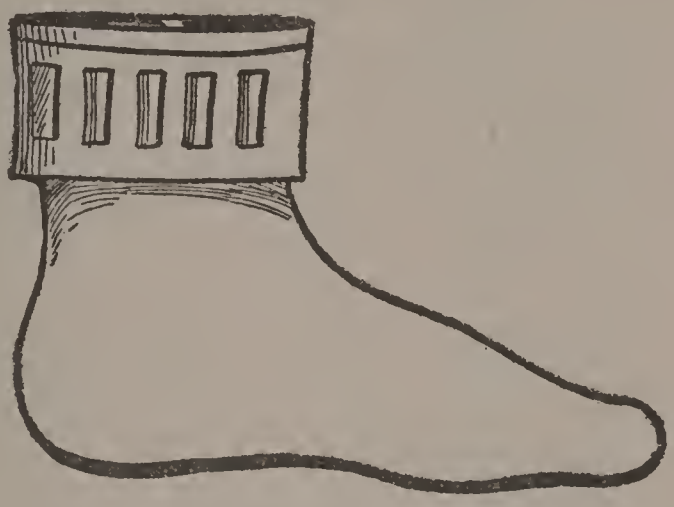
An improvement on this style was later introduced in the form of heel and toe guards as shown in the figure to the right, on page 6.

Fashion was as changeable and exacting in those days as in our own time. Among the upper classes the sandals were heavily embroidered or ornamented with costly jewels. The art of dyeing leather had been discovered and different-colored sandals were worn for specified occasions.

In the countries to the north — Assyria, Babylonia and Persia — the styles in footwear ranged from the sandal form to high stocking-like boots. At a period about 1500 B. C. the rulers of all these nations, including Egypt, were very friendly. Rare and costly gifts were fre-

quently exchanged among them and a great deal of correspondence was indulged in. Trading among the nations was also encouraged. As a result we find the footwear of these other countries pictured in the paintings and engravings on Egyptian walls belonging to that period. The warm climate prevented the shoe or boot form of footwear from becoming popular in Egypt. However they did find some popularity, perhaps

as more or less of a fad, and many of the old engravings show an ankle shoe with the top decorated in the form of an anklet as illustrated here. Gold and bejewelled bands were worn around the ankles when the feet were bare, and it is pos-



sible that these anklets were worn on the outside of the shoe like a round garter to keep the top of the shoe in place.

The type of ankle shoe and the gayly decorated high boot of soft leather, such as shown in the following figure, were worn extensively in Assyria and Persia. Some of these styles are thought to have come originally from the Chinese. In fact many authorities believe that the ancient Kingdom of China was civilized even before Egypt and much of the culture of Babylonia may have been acquired from Chinese pilgrims. We know that in very ancient Chinese literature references are made to traditions in which the shoe figures, but it is impossible to determine the age of these legends. The ancient

Mongolians are known to have visited Assyria at a very early period, but it is not always safe to assume that similar things came from the same source. It seems to be part of the great scheme of creation for the progress of the human race to move forward along similar lines in widely separated parts of the globe. Thus we find that the ancient Inca Indians of Peru about three thousand years ago solved their footwear problems in a manner very similar to that of the Egyptians on the opposite side of the world.

CUSTOMS AND LEGENDS OF OLDEN TIMES

The custom of removing the shoes in sacred places seems to have been common to all the early races that lived in the warm climates. This custom is prehistoric. In the sacred writings of the oldest religions, which were written at a time that seems ancient to us, this practice of uncovering the feet was referred to as "ancient" even at that time.

The founders of our own religion also observed this custom. It will be recalled that when Joshua had led his people across the river Jor-

dan, the messenger of the Lord appeared to him and made himself known by saying, "Loose thy shoe from off thy foot; for the place whereon thou standest is holy." The removal of the shoe as a mark of respect still prevails in the oriental countries. Missionaries tell us that even after being converted to Christianity, the natives in some places still persist in leaving their footwear outside the church door unless otherwise instructed.

THE SHOE GIVEN AS A PLEDGE

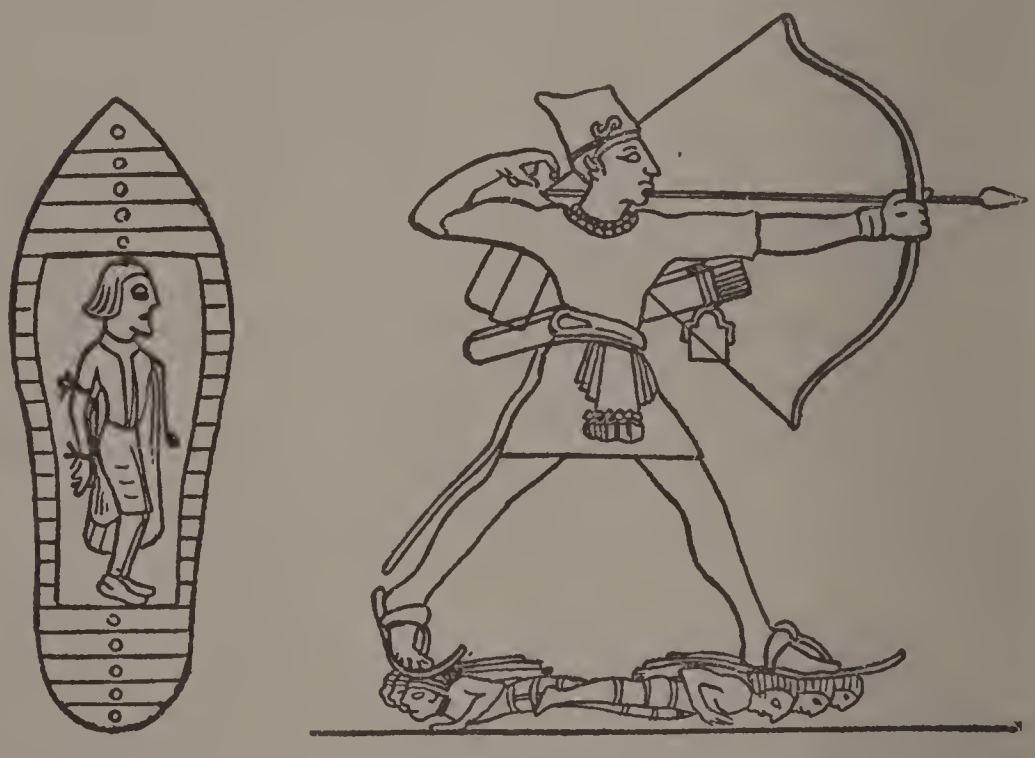
The shoe was often used as a pledge by the people of the old world, probably because it had come to be a symbol of possession. In the Book of Ruth this custom appears several times in business transactions. For instance, when Ruth's "next of kin" goes through the authorized ceremony of transferring her and a parcel of land to Boaz, the former gives his shoe before witnesses. In the same chapter the custom is explained: "Now this was the manner in former time in Israel concerning redeeming and changing, for to confirm all things a man plucked off his shoe and gave it to his neighbor; and this was a testimony in Israel."

This idea of the shoe as a symbol of possession survives in many of our everyday expressions such as saying that a person has "stepped into another man's shoes" when we mean that

he has assumed the authority that belonged to another.

THE SHOE IN EARLY EGYPTIAN CUSTOM

The sandal was used to indicate class or social distinction in Egypt. Slaves and captives were obliged to go barefooted or wear a very primi-



tive sandal of woven palm leaves. The "common people" were permitted to wear sandals of any desired material, so far as we know, but they could not have long pointed toes. This was reserved as a mark of caste to be worn only by persons of rank and warriors of high degree.

One remarkable custom among the upper classes was that of lining the sandal with cloth on which the figure of a captive was painted, as shown in the sketch. This "down-trodden" po-

sition was considered symbolic of the place in which they hoped to keep all the enemies of their country.

This same sentiment is illustrated in the engraving shown in the preceding figure. It is believed that these pictures belong to the period when the children of Israel were in bondage in Egypt and that the prostrate figures were intended to represent Hebrews. Notice the long upward-pointed toes of the sandals of the royal warrior.

AN EGYPTIAN CINDERELLA

An old legend, said to date back to a very early time in Egypt, tells a story rather similar to our fairy-tale of Cinderella. It is interesting to note how closely this ties up in its general appeal to the style of children's stories that are popular even today.

A little slave girl named Rhodope lived by the Nile. According to the custom she was not permitted, because of her station, to wear sandals. But it was the desire of her heart to possess a pair, all beautifully embroidered such as those worn by the great ladies of the court. Day after day it was her duty to remove the sandals for these noble ladies, and she never failed to study them carefully so that she knew just how each was made. So intense was her longing to possess a pair of the coveted footwear that the little captive girl would hide herself away in the tall

grasses and willows by the river bank. Here she spent many hours fashioning sandals from reeds, and with threads of stained flax she created designs of many colors. As time went by, her workmanship became beautifully perfect, but she never wore the sandals away from the hiding place.

One day, an eagle, weary from flight dropped down to rest at this spot and when he flew away he carried one of the sandals with him. Miles, miles he flew, over desert and hills until, weary again, he paused over the palace of the king. There he let the sandal fall at the feet of the young prince. The sandal was so slender and graceful and the embroidery so exquisitely done that the prince at once expressed a desire to know the lady who owned it. Heralds were sent forth to find the maiden of the sandal and finally the prince himself joined in the search. After many days he found the object of his quest and Rhodope returned with the prince to his own city where she became his princess.

This story is typical of the manner in which the shoe has figured in the folk-lore and traditions of nearly all ancient nations.

IN THE TIMES OF ALEXANDER THE GREAT

It is difficult to trace the manners and customs of the very old races because of the destruction wrought by invaders who came into their territory and conquered the inhabitants. In order

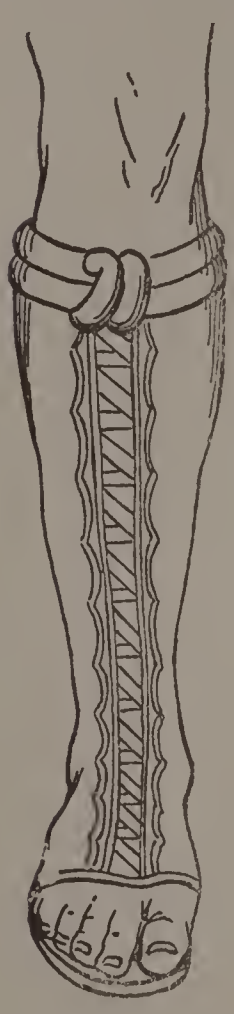
to completely subdue a nation, it was considered necessary to completely wreck all public buildings and sacred places and if possible to destroy all records. The next step in victory was to force upon the conquered people the religion and customs of the victors.

After Alexander the Great had flung the battle lines of Greece into the "four corners" of the old world, the Grecian influence spread to all the conquered nations and was easily traceable even in the footwear of the people. Engravings from the ruins of cities in the region of the Persian Gulf show low shoes with typical Grecian borders, as pictured here.

The Greeks of the fifth and sixth centuries before Christ, wore a great variety of footwear. The sandal was the most popular for city wear but the rustics and field workers used a low slipper called the *soccus*, as shown here.

A high leather boot, reaching above the calf of the leg, was worn by the soldiers and sometimes by men of high rank. This boot was laced down the front with leather thongs and the toes

were left open. It was called the *cothurnus* or *buskin.* In later years, when Greece became the center of learning, these two styles of footwear became identified with the drama. The soccus was worn by comedians because it suggested the country bumpkin; the buskin was worn by the tragedians because of its dignified, stately appearance. The custom prevailed to such an extent in classic drama, that even to this day members of the dramatic profession are often referred to as "brothers of the sock and buskin." The drawing opposite illustrates the buskin.



From the writings of the Greek scholars, we learn that shoemaking was not only a recognized home trade but that shoes were exported in large quantities. There were shoes of all colors and for all occasions. Purple and blue were the favorite colors of the upper classes. The tops of the high shoes were often decorated with the heads of small animals; a custom which was later adopted by the Romans.

The Spartans of Greece believed that indoor occupation was not manly and so they had little respect for men who followed the trade of shoemaking. The boys and young men of Sparta

were encouraged to go barefoot. One of their famous philosophers while criticizing the members of the Assembly for not taking more physical exercise, told them that their faces had grown so pale, they looked like "a conclave of shoemakers."

SHOES OF THE ROMAN EMPIRE

The early Romans have been accused of "borrowing" almost everything they had except their valor. This same thing can be said of nearly any nation that won its glory by conquest. And even if the Romans did borrow their styles in footwear from their neighbors, we must give them credit for making many improvements on the original.

The Romans developed the sandal until it was a work of art and a real protection to the foot. The style shown here is fairly representative of the general type. Almost every possible variation of the sandal was worn in Rome. The rustics wore a sort of combination shoe and sandal; an inner sock of soft leather under a heavy outer sole, made sandal-fashion.

One of the adaptations in footwear for which

the Romans deserve much credit, is the *caliga*. The soldiers of the Empire were very much impressed by the spiked boots that were worn by their enemies to the north. The spikes in the sole gave the enemy an advantage when fighting in the mountains. But the Romans did not want to be encumbered with a heavy boot, so with characteristic ingenuity, they produced the caliga. This was a sandal with a very heavy, spiked sole as shown here. Much of the "glory that was Rome" was attributed to the success of this footwear for the soldiers.

A form of boot produced during the days of the Roman Empire proved so practical that the style has survived with very little change to the present time. This style is shown in the small picture of the Etruscan priest. The boot is very much the same as a type of fishing boot

used today in some parts of the United States.

The Roman emperors, when the Empire was at its height, wore elaborately decorated boots. Gold, costly gems, rare cameos and, in fact, all available jewels of great price were lavished on the imperial footwear. A statue of the Emperor Hadrian shows a boot that was typical of those worn by the higher classes at his time. It is slightly more than ankle high, square toed, with an elaborate design of flowers and a small animal head at the top of the laces.

The Romans had many interesting customs and traditions relating to the shoe. For instance, it was considered "bad luck" to put on the left shoe before the right. One of the early emperors nearly lost his life as the result of such oversight. It was an evil omen, so we are told in an old poem:

> Augustus, having by oversight
> Put on his left shoe 'fore his right,
> Had like to have been slain that day
> By soldiers mutining for pay.

SHOES OF THE EARLY BRITONS

When the Romans invaded the "Isle of the Angels," as they called ancient England, they found the inhabitants semi-barbarians. Their lack of development was especially noticeable in their footwear, which had scarcely advanced beyond the primitive wrappings of raw animal hides. Some attempt had been made to construct a kind of moccasin by lacing together pieces of untanned cow-hide. Such slippers could scarcely keep out the moisture. The Britons tried to find a remedy for wet feet by the doubtful method of piercing the foot covering with holes in order that any water that entered would not remain in the shoe. Little wonder, then, that these primitive people gladly adopted the advanced ideas in shoemaking introduced by the Romans.

The Saxons who followed the Romans and took possession of the Island, adapted the Roman sandal to the colder climate by increasing the thickness of the sole. To do this they inserted alternate strips of cork and leather. A high shoe, or half boot, was also worn by the Saxons; it was without heels, and was laced down the front to the toe instead of the instep.

The shoes of the nobility at that time were very extravagant. Colored leather, with gilt or embroidered tops and even shoes made of cloth of gold were worn.

COMING OF THE NORMANS

In the eleventh century, when England was once more invaded, the victorious Normans introduced a new style of footwear. It was of soft leather, covering the foot and ankle; more like a leather sock than a shoe. The toes were pointed. Gradually fashion decreed a longer and longer toe and at last the points became so long that it was found necessary to stuff them with moss to keep them straight. This practice produced the fantastic mode of packing the tips with tow and twisting them into the shape of a ram's horn; a fad that was as short-lived as it was inconvenient. The Norman shoes were decorated with every imaginable pattern in bright colors, fretted with gold or silver and generously ornamented with jewels.

It was the fashion for a time to have these soft shoes embroidered or designed after the patterns of church windows. The shoe pictured in the figure on page 20 is a very good illustration of this type of footwear creation. The old

English poet, Chaucer, in describing a parish clerk, says he wore "Paul's windows corven (carved) on his shoes."

In fact, we are told that in Old St. Paul's as it existed in London before the great fire of 1666, the famous "rose window" resembled the design of the shoe shown in this sketch.

CORDWAINERS AND COBBLERS COMPANY OF LONDON

The boot and shoe makers of England were called *cordwainers;* a name derived from the city of Cordova in Spain where very fine leather of goat skin and split horse hide was tanned and later exported. The art of tanning and coloring leather was introduced at Cordova when that city was occupied by the Moors. These people were a tribe of Mohammedans from northern Africa; they invaded Spain on a religious conquest in the eighth century and occupied the southern part, in the district of Cordova, until the time of Columbus. The Moors had learned tanning from the Egyptians and their product was superior to that of the countries to the north of Spain. They supplied leather to France

and England for over two centuries, and the men who made this leather into shoes came to be known as *cordovanners* or cordwainers.

As the national wealth increased in England, it became possible for more people to buy good shoes. This demand brought into the trade many inexperienced and, in fact, dishonest shoemakers who sold inferior goods. To protect themselves against the evil effects of this poor workmanship, the cordwainers formed a union or *guild,* as it was called. Although the guild idea was by no means a new one this organization later came to assume a position of considerable strength and influence among the early shoe makers. Membership in the cordwainers guild was limited to those who could qualify as experienced craftsmen, and the public was cautioned against buying goods of non-members. This organization was chartered by the king in 1272 and was known as the Cordwainers and Cobblers Company of London. The term "cobbler," by the way,was in the early days applied to those men who did the fine, skilled work on shoes. Today we think of him as the rather crude workman on repair jobs.

From the time of granting the charter, cordwainerie became an honored craft in England. The organization of cordwainers is still in existence and retains its original name although, at the present time, it is conducted more as a club than a guild.

A FASHION FROM POLAND

The crowning freak of fancy came when the pointed toes had become so long as to be inconvenient. Court dandies conceived the happy thought of turning them up and attaching the tips to their garters at the knees, with chains of silver or gold. This ridiculous fad is said to have originated in Poland which was at that time the center of fashion for all Europe. Accordingly the shoes were called *poulains* after the old French name for Poland.

The fad persisted until the clergy complained that such footwear prevented people from kneeling for prayer in church, and shortly after a royal decree limited the points to two inches in length.

As in every age, fashion turned from one extreme to the other. The style of boot with such extreme length of toe as to be inconvenient, now gave way to one with a toe so broad as to be absurd. This is illustrated in the type known as the *duck-bill*. The uppers of these shoes were made so low as to barely cover the toes, and were slashed

to show the brightly colored hose beneath. They were commonly made of velvet, satin, or silk, and richly ornamented with bows or rosettes. A narrow strap and buckle across the instep bound them to the foot. As in the case of the long-toed shoes the fashion went to such extremes that it was later considered necessary to limit by law the width of the "duck-bills" that might be worn.

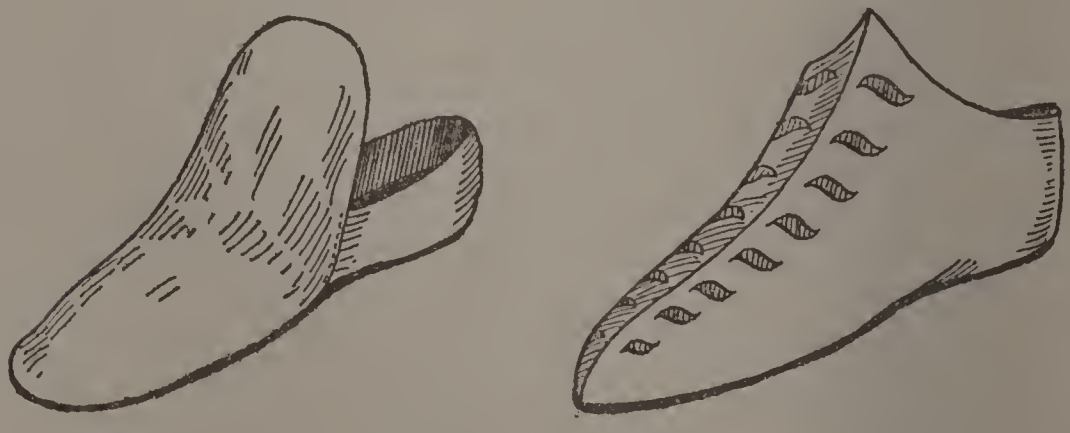
SIXTEENTH CENTURY INFLUENCES

It was at about this time, during the reign of Henry the Sixth, that long-piked *clogs* were much in vogue with gentlemen. Clogs were outer wooden shoes worn to protect the shoe from the mud. Seeking as usual the extravagant in dress, rather than the practical, the short toe of the shoe was contrasted with an excessively long sole of the clog as brought out in the sketch. on the page following. These wooden clogs were made fast to the foot by a broad strap over the instep, by leather laces, or by the pressure of two small wooden side-pieces.

In Elizabeth's reign, during the end of the six-

teenth century, the pointed toes came back into popularity. This time they were called *krakows*,

which suggests that the revival, like the original fashion, came also from Poland. Krakow is the name of a large Polish city. In fact, we are told that in one of the royal palaces in Poland there is



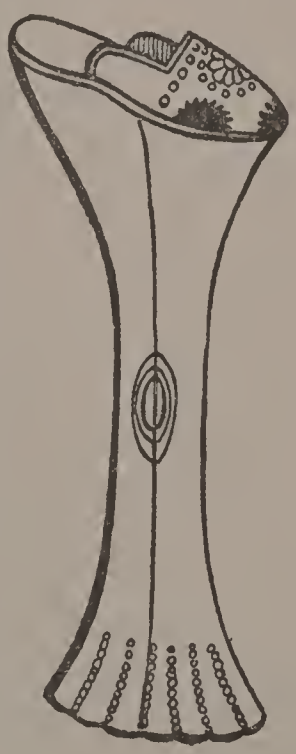
a portrait of a nobleman of the sixteenth century wearing shoes with long upturned toes

fastened to the knee by means of an elaborate chain.

This fashion was shortly replaced by the far more sensible shoes, as shown opposite, such as those we see pictured on statues and portraits of Shakespeare and Sir Walter Raleigh.

A VENETIAN CREATION

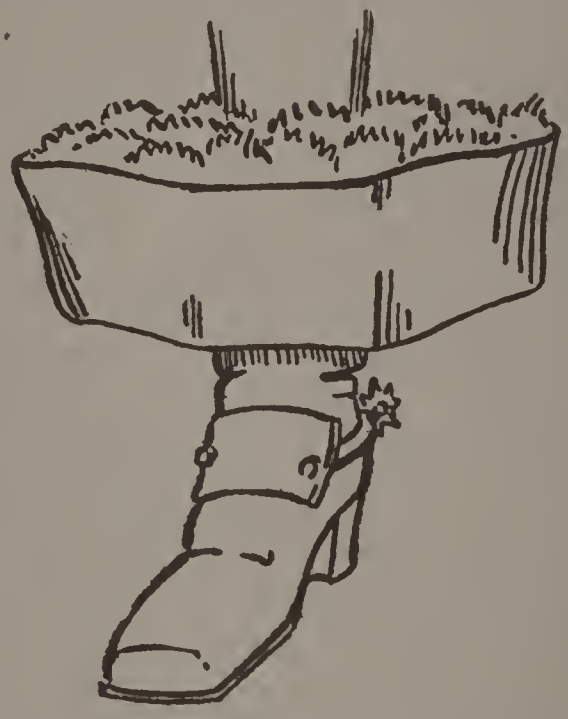
Toward the close of the period of Queen Elizabeth's reign the women adopted a style that threatened to outdo in absurdity all previous fashions. The original purpose, which was to keep the slipper out of the mud, was sensible enough. However, the fad when carried to its extreme came to be very similar to the childish sport of walking on stilts. The *choppine* was the name given to this novelty. It was built of wood covered with red, white or yellow leather and varied in height from eight to sixteen inches. The illustration shows how the slipper was attached at the top. The women of Venice were the first to wear the choppines but the fashion spread rapidly to England and other parts of Europe. When walking on choppines, it was necessary for a lady to be accompanied by two or more servants to support her as she tottered about the



uneven streets. The fashion excited the ridicule of more than one writer of the times, one of whom describes the women of Venice as "*mezzo ligno, mezzo carno*" (half wood, half flesh).

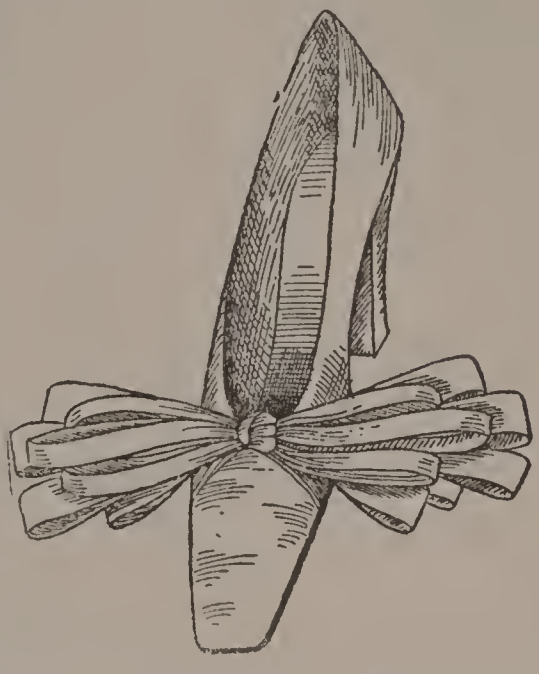
PARIS BECOMES A FASHION CENTER

It was during the reign of the French king Louis XIV that Paris began to dictate the fashions for the rest of the world. One of the first of the footwear styles from Paris is shown in

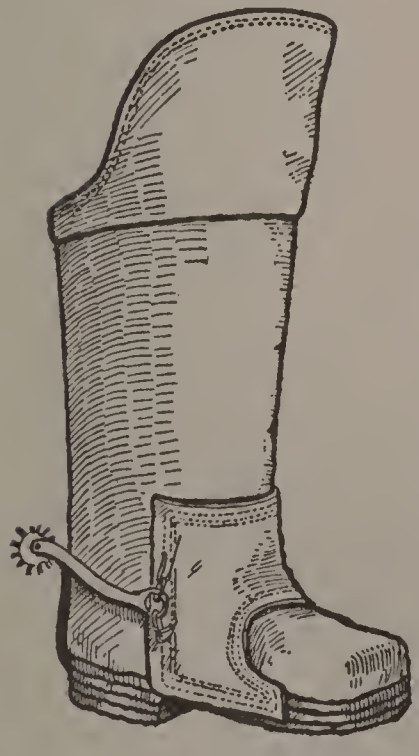


this picture. It was a high boot with an adjustable top that could be turned down. The inside was lined profusely with frills of lace. It was the custom to pull the boot up when riding and fold it down when walking so that the lace would be prominently displayed. As the style increased in popularity, the boots were made wider and wider at the top to allow for more

lace, until finally it became necessary for the wearer to walk with a decided straddle.



The high heel had been worn in France by the nobility for some time before it was generally adopted in other countries. One very ungainly style that won much favor was the high heeled pump of the accompanying illustration. This pump was adorned with enormous starched ties that extended for some inches on each side of the foot.

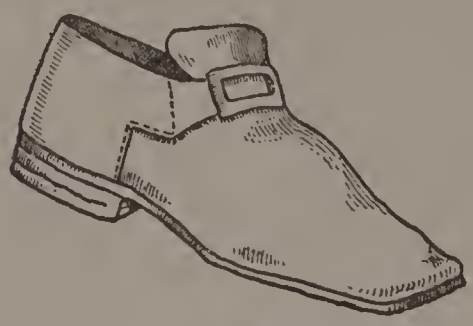


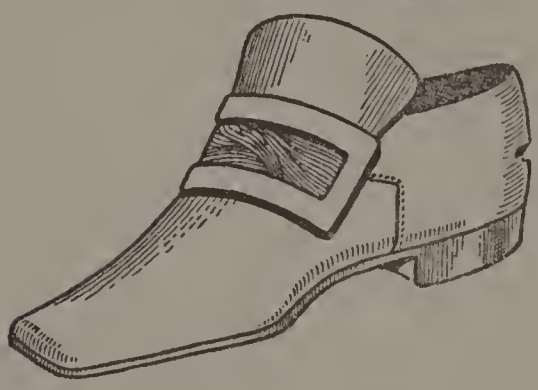
BOOTS OF THE SEVENTEENTH CENTURY

The *jack boot* was part of the regulation equipment of the soldiers, both cavalry and infantry, at the end of the seventeenth century. It was probably the clumsiest piece of footwear ever designed. The heel was high and bulky; a huge slab of leather was sewn across the instep. This was provided with holes for

attaching the spurs, which were supported by an iron rest at the back of the boot.

In severe contrast to this rigid boot, were the fashions in women's shoes of the same period. Toe caps then made their first appearance. They were usually made of black velvet on white kid, or some similar combination. Delicate embroidery and silver buckles were popular on all forms of women's shoes. The high heels of the nobility were generally colored red and the buckles were as large and expensive as the wearer's purse would permit. The buckle shoe was destined to a long period of popularity. The general style, outside the nobility and military circle, was a combination of the buckle and a low cut substantial shoe with a square toe and rather high heel. This type of shoe continued for many years; just how many, can best be realized by comparing the two sketches shown here. The former represents the shoe worn by John Alden, who came to America with the Pilgrims; the latter is the shoe worn by George Washington over a hundred and fifty years later.





THE PATRON SAINT OF SHOEMAKERS

It is fitting that a trade so closely woven with romance should have a heroic patron saint. Crispin and Crispianus were two brothers of Rome who were exiled from their native land because of their Christian faith. It was in the fourth century that they journeyed into France, preaching the new faith to all who would listen. They were shoemakers by trade and supported themselves by selling shoes as they traveled along. An angel was believed to have supplied them with leather. But their gospel was not welcome in France at that time and the brothers were later executed at Soissons. Thus they became the patron saints of the shoemakers. St. Crispin's day, the 25th of October, is still observed as a holiday in some countries by members of the shoe trade.

CHAPTER II

SHOEMAKING IN THE UNITED STATES

EARLY COLONIAL SHOEMAKERS

The story of the American shoe industry runs a close parallel to the history of our country. The early colonists faced untold privation and hardships with a grim determination to build a nation in the wilderness of the new world. In their struggle to obtain the necessities of life, they laid the foundation of many a great industry.

The severe winters of New England made warm clothing and stout boots a vital necessity. Every shoe salesman knows from personal experience that *demand* for shoes is the forerunner of *supply*. By this same rule, we find the birth of the shoe industry in the northern colonies where the need was greatest.

The first shoemaker on record in New England was Thomas Beard who came on the second voyage of the Mayflower and settled in Salem in 1629. The name of "Isaac Rickerman, shoemaker," also occurs in the early records of Salem at about this time. Philip Kertland settled in Lynn in 1635 and practiced his trade in the little

town which later was to become one of the centers of the shoe industry.

These pioneer shoemakers were indeed welcome among the colonists and records show that special privileges were granted to make settling in the colonies more attractive to men of the shoemaking trade. Salem, for instance, gave ten acres of land to Beard and Rickerman. A little settlement at Reading, Mass., extended "rights to wood and herbage" to a shoemaker — which means that he could gather wood for fuel and any herbs that he might require for medicine, without the payment of a general tax.

THE VISITING COBBLER

It was the custom in the early days for the cobbler to travel from house to house with his kit in a wheelbarrow or over his back. Generally these traveling cobblers were *journeymen* working for practical experience and recognition as masters of their trade. A journeyman is a person learning a trade, who has advanced in experience and length of service beyond the first or beginner's stage as apprentice. It was the early custom in the guilds, to require of a member that he produce what was called his "masterpiece" before receiving official recognition as a master of his trade.

The visiting shoemaker would arrange with his trade to live in the household while making shoes for the family; taking his meals

and sleeping quarters as part payment for his labor. Each member of the family, on such occasions, would file up and take his turn standing on a piece of paper while the foot was roughly outlined in charcoal to get the size. The shoemaker would then select from his meagre supply of lasts, the one that came nearest to the outline. The leather was supplied by the farmer from hides obtained and tanned on his own or a neighbor's farm.

These visits of the cobbler were always looked forward to by the families of farmers in the more remote districts. He brought with him the latest news and stories from the outside world. He was looked upon as a very wise man in the community and, doubtless, with good cause. Traveling as he did from village to village and living intimately among the families, sharing in their joys and sorrows, it would be natural that the shoemaker should develop into a philosopher. Many preachers and writers of that period made their start in life by making shoes.

HOME-MADE SHOES

Only the well-to-do families could afford the extra expense of boarding the cobbler. Among the less prosperous class, the farmer and his sons usually made up the family supply of shoes around the kitchen hearth during long winter evenings, while the women folk were spinning or mending.

The leather was always home-tanned. Some times several neighboring farmers would have a community vat for tanning purposes. Very often the vat would be an old row boat, buried in the ground. Here the farmers of the neighborhood would bring their hides and put them to soak. This was a great saving of time and money — the neighborhood vat — and it was the beginning of the great tanning industry.

To overcome the limitations of the traveling shoemaker, Philip Kertland, of Lynn, attempted to introduce the shop system of making and selling shoes. He realized that considerable time would be saved if he could persuade customers to come to him instead of going to them. Accordingly he opened a shop but the early settlers were not easily won over to the new method. In fact, it was not until many years later that the plan of shop selling really took hold. The chief objection to the new system of shoemaking was the additional price. An advance in charges was necessary because the shoemaker no longer obtained his lodging and food in part payment for his labor. It was argued by those who opposed the plan that imported shoes from the old country were more desirable and no more costly. So long as this spirit prevailed, the colonial shoemakers could not compete successfully with their European rivals.

Although Kirtland's example was followed from time to time by shoemakers who opened

shops, the system did not become established until nearly a hundred years later when John Adam Dagyr, of Wales, came to Lynn in 1750. This worthy Welshman had a genius for organization. He brought with him all the latest fashions and methods from Europe and gave instruction to the colonial shoemakers. Under his guidance the business of shoemaking became systematized and within a short time the shoemakers of New England were able to produce shoes worthy to compete with the best of the imported goods.

Little square shoemaking shops known as "ten footers" began to spring up in all the settlements of New England. Farmer boys would travel to Lynn, which by that time had developed into a shoe center, to learn how to make shoes. After acquiring a fair knowledge, they would return to the farms and build ten-footers of their own to be patronized by all the neighboring farmers.

In the latter part of the eighteenth century, about the time of the Revolution, the ten-footers were a familiar sight throughout the entire country-side. Repairing was also done by these shops and, as most of the farmers came from a distance, wearing the boots to be repaired, it became a practice to sit in the shop while the mending was being done. Undoubtedly the old legend that still exists today, "Repairing done while you wait," was originated at that time.

This custom led to the practice of meeting at the cobbler's to talk over affairs of the day. We are told that many of the plans that helped win the war for the colonies were conceived in these little ten-footers.

THE APPRENTICE SYSTEM

When shop shoemaking had been established for some time in the larger towns, the master craftsmen found that it was a handicap to have the young men come in for a short time to learn the trade and then leave as soon as they considered their workmanship fair enough. Complaints came in from outlying districts that the shoes made by these cobblers were not up to the standard set by Dagyr and his co-workers. To remedy this evil, the apprentice system, as originated in Europe, was adopted. Boys were "bound" by contract to serve for periods averaging about seven years. The terms of the apprentice contract papers were given to the boys at school as part of their copy-book exercises so that they would be familiar with the form and conditions of the agreement. It was necessary for at least two witnesses to sign the papers. Relatives of the apprentice usually assumed this responsibility. The following is a copy of such a contract. Note the old-fashioned style of expression which, even up to the present time, is used in the preparation of legal papers. The Colonists, in adopting the old English laws,

hesitated to change any form of expression for fear of losing some of the original meaning or legal soundness.

"THIS INDENTURE, WITNESSETH,[1]

"That John Goedersoon, now aged fourteen years, eight months and twenty-seven days, by and with the consent of his step-father, John Wright, and his mother, Mary Wright, hath put himself, and, by these presents, doth voluntarily and of his own free will and accord, put himself Apprentice to Frederick Seely of the City of New York, Cordwainer, and after the manner of an Apprentice to serve from the day of the date hereof for and during, and until the full end and term of six years, three months and three days next ensuing, during all which time the said Apprentice shall his master faithfully serve, his secrets keep, his commands everywhere readily obey.

He shall do no damage to his said Master nor see it done by others, without letting or giving notice thereof to his said Master. He shall not waste his said Master's goods nor lend unlawfully to any. He shall not contract matrimony within the said term; at Cards, Dice, or any unlawful game he shall not play, whereby his Master may have damages. With his own goods nor the goods of others, without license from his said Master . . . he shall neither buy nor sell. He shall not absent himself, day or night, from his said Master's service without leave, nor haunt ale-houses, taverns or playhouses; but in all things behave as a faithful Apprentice ought to do, during the said term.

And the said Master shall use the utmost of his en-

[1] The original of this contract is now the property of Mr. Charles Wellesley Allen, Brooklyn, N. Y.

deavors to teach, or cause to be taught or instructed, the said Apprentice in the trade, or mystery, of a Cordwainer, and procure and provide for him sufficient meat, drink, washing, lodging and clothing fit for an Apprentice, during the said term of service and four quarters of night schooling during the said term.

And for the true performance of all and singular the Covenants and Agreements aforesaid, the said parties bind themselves each unto the other firmly by these presents. In Witness Whereof the said parties have interchangeably set their hands and seals hereunto. Dated the sixth day of August, in the thirty-fifth year of the Independence of the United States of America, and in the year of our Lord, eighteen hundred and eleven.

Sealed and delivered in the presence of L. Cowdrey.

Frederick Seely,
John Goedersoon,
Maria Wright,
Jahan Wright."

SALE SHOES

It is interesting to note how one phase of development led to another in the industry. Up to the time when the apprenticeship system was introduced, shoes were built only on the "made to order" plan. When apprentices were to be employed for a period of several years, however, and were to be fed and clothed during all that time, the master shoemakers soon recognized the fact that the boys were likely to eat just as much during a dull season as when business was rushing. It became necessary, therefore, in order to keep the boys busy and "earning their

keep," to make up a stock of shoes and either sell them to the village store or to send them into Boston to be peddled or displayed in a shop if possible. These were called "sale" shoes and many interesting stories have been told by the founders of the trade relating to their experiences in disposing of "sale" shoes. If a horse and cart were not available to carry the shoes to market, a push-cart or even a wheelbarrow would be loaded up and pushed over the rough country roads to town — sometimes a distance of twenty miles or more.

In an account written by one of the men who did this, he mentions that the trip to Boston was usually made on Saturday so as to take advantage of the week-end marketing. The shoes would be sold on a busy street corner and if any stock remained at the end of the day, it would be stored in a convenient cellar until the following Saturday. It was not long before this custom led to the opening of shops in town for the purpose of disposing of "sale" shoes. Many of the shoemakers who had trudged the roads to market, later developed into successful shoe merchants.

COMMERCIAL DEVELOPMENT

The town of Lynn had by this time established a leading place for itself as a shoemaking center. This position has, in a large measure, been retained to the present day. General Washington,

while passing through Massachusetts in 1789, stopped over night in Lynn and in a letter written on that occasion mentioned that he was in "Lynn — the great shoe town."

But the shoemakers of the colonies had many difficulties to overcome. With the development of social life the demand for imported shoes increased, and, just as the twentieth century woman turns to Paris for her gowns, so the colonial dames looked across the Atlantic for the latest things in footwear. Nothing in the way of skill or workmanship could tempt them to buy the home-made product while the other was available. For this reason, the pioneer shoe merchants had an up-hill struggle in marketing fine shoes, although there was a good market for heavy footwear. Advertising and various forms of publicity were utilized to encourage the sale of the better grade of home-made goods but for the time being, at least, this proved to be of very little avail.

FIRST PROTECTIVE TARIFF

This acute situation in the American shoe industry was relieved in 1789 through the efforts of a young Quaker named Ebenezer Breed. He was born in Lynn and lived there until about twenty-one years of age. It was there, of course, that he acquired a knowledge of the shoe business and a keen interest in the problems of the young industry. This interest did not flag when

he moved to Philadelphia, which was at that time the national capital. Because of his Quaker parentage, he was received into the best families and met many influential men among whom were members of the Continental Congress.

For some time young Breed had been advocating a tariff on shoes for the protection of the home industry. When he believed that his social position was fairly well established, the young enthusiast gave a brilliant dinner party to which he invited the most notable people of the city, several members of Congress and many of the social *élite*. To this remarkable assemblage, Breed made an impassioned appeal for the adoption of a shoe tariff. He was blessed with a ready wit and a gift for oratory. His guests were carried away by his eloquence. Sympathy for the grievances of the American shoemakers spread like wildfire. When Congress assembled, the bill providing for a protective tariff on shoes was passed with scarcely a dissenting voice.

FACTORY SYSTEM

Although a few shoe "factories" existed as far back as 1786, the factory system did not become firmly established until some time later. As the commercial conditions of the country developed, it became possible to buy materials in larger quantities and to dispose of the shoes in correspondingly greater numbers. The more

prosperous shoemakers began to employ the less successful ones to work for them. This meant larger shops to accommodate the increased working force. It was soon found that some men were much more expert at one operation than another and as a result the workers were divided into "teams" or "gangs" to perform the particular work for which they were best adapted.

Sometimes these gangs worked independently, going from one factory to another to perform the same operation. A gang of bottomers, for instance, would have contracts with certain manufacturers to do all the bottoming for their factories.

The shoe uppers were often given out to women to be sewn at home during their leisure hours. This was called *binding* shoes. All thrifty housewives kept a supply of uppers in the house and during spare moments, rather than sit with idle hands, they would improve the time by binding shoes.

This method of working in teams and gangs continued until the invention of machinery. By the year 1800, the factory system was loosely established; although the factories of those days, when all work was done by hand, had very little in common with our present day conception of what a factory is. The clicking of shears, the dull thud of pounding on the lap-stone and the hum of the workers' voices made a very different

impression than that to be had from our tremendous factories where the roar and vibration of machines, the thousands of workers and the endless output bewilders the onlooker.

EARLY FASHIONS IN FOOTWEAR

There was little variation in the styles of footwear among the colonists until after the Revolution. The substantial boots and shoes with the square toes, worn by the Puritans, continued in one form or another until they finally assumed the form of the well-known *colonial pump*. At about the same time, shortly after the war, the Hessian boot was introduced. This style was borrowed from the Hessian soldiers who fought in the Revolution. It was more or less military in design, with a white top, and a spur at the heel.

The next influence to affect American styles came from France. After that nation recovered from her own revolution, the natural tendency of the people was to discard any form of dress that had been worn by the nobility. High-heeled shoes were, therefore, eliminated and in their place came a soft spring-heeled shoe. This

fashion spread to America and was especially noticeable in the women's shoes at that time. Examples of this style were to be seen up to the time of the Civil War.

A style for men that came from England and won much popularity, was the Wellington boot. This boot was also of military origin, receiving its name from the general who led the British troops at Waterloo. The style was gradually refined until it became a dress boot to be worn on ceremonial occasions. No gentleman's wardrobe was considered complete without a pair of Wellingtons as shown on the page opposite.

RAPID DEVELOPMENT OF THE INDUSTRY

The population of the states increased rapidly after the war of 1812. People flocked from the "old countries" to the new republic as fast as the ships could bring them. This meant an increased demand for all commodities, and business in all lines prospered greatly. The shoe industry was no exception, in fact, it led the others because it was thoroughly organized by that time and was protected by the tariff.

A MACHINE FOR WOODEN SHOE PEGS

In 1815 a machine was invented for cutting wooden shoe pegs. Shoes that were too heavy to have the soles attached with thread had always been pegged. These pegs were whittled

by hand and used very much as nails. The invention of the peg-cutting machine was significant because it was the first bit of mechanical improvement that had been adopted in shoemaking for many centuries.

CHAPTER III

SHOEMAKING IN THE UNITED STATES
(*Continued*)

EFFECTS OF THE PANIC OF 1831

As the result of the rapid development of the West and with over-night real estate and some questionable business booms, there came a hectic period of wildcat speculation that ended in the financial panic of 1831. Many shoe manufacturers who had invested their earnings in unsound stocks, suffered heavily when the crisis came. Accordingly, failures in the shoe trade were overwhelming. Those who were so fortunate as to have a business left were sobered by the experience through which they had passed, and now devoted their efforts toward getting the industry back on its feet.

Periods of financial stress always put people in a mood for investigation and close application to business. This leads naturally to attempts at improving upon previous methods in the hope that panics and hard times may be averted in the future. Hence we find that the panic of 1831 led to a period of invention in the industrial world. For several years this experimenting went on without producing

any visible results, but the continued effort was bound to bear fruit sooner or later. Some people now believe that it is to the panic of 1831 that America owes her present enviable position at the forefront in the mechanical development of industry. This opinon, however, is based on the fact that a movement in the right direction was started, although results in the form of workable ideas did not follow until some years later.

ROLLING MACHINE

In 1845 there was invented the first machine to be widely used in connection with the shoemaking industry. It was what is now known as a *rolling machine*. For fifteen years attempts had been made to develop a machine to do this work but it was not until 1845 that satisfactory results, in the form of a workable machine, were obtained.

The rolling machine did away with the old-fashioned method of pounding leather upon a lapstone with a flat faced hammer, in order to solidify or bring the fibres of the leather closely together. With this machine leather could be rolled in about a minute, that had previously taken half an hour to prepare by hand.

HOWE SEWING MACHINE

The Howe *sewing machine,* invented in 1846, was the next stepping stone in the mechanical

development of the shoe trade. Previous to this time sewing had been done entirely by hand, and it need hardly be said that the work had been tedious and wearing. Elias Howe, a workman in a Cambridge machine shop, changed all this. He came from a family of inventors. He had watched his wife patiently sewing for her large family, night after night, and it occurred to him that a machine to do sewing would end a great deal of toil and drudgery. This idea, however, was not a new one; there had been patents on sewing machines taken out in England as early as 1750, and Napoleon had offered a large reward to encourage effort leading to the invention of such a device.

Up until this time and ever since, in fact, shoes have always been a serious problem in the army. Napoleon saw the advantage in making strong, serviceable shoes quickly, thereby increasing the marching capacity of his men. But he did not have the particular kind of inventive genius necessary for the creation of an automatic sewing device. It was only after long-continued toil that Howe finally succeeded. At first he worked on his experiments after factory hours. Then as his faith in the idea grew he gave up his regular work to devote all his time to the invention. He lived from hand to mouth doing odd jobs and even pawning household possessions to get the daily bread for himself and his family.

NEEDLE WITH POINT IN THE EYE

It took Howe eight years to build a machine that would stitch. There is a story that one night, discouraged by failure, he threw himself down for a restless sleep. He dreamed that he was seized by a tribe of savages whose leader demanded that Howe sew a shirt with his new machine else suffer penalty of death. He was unable to carry out the command and the band of savages set upon him. As they were about to kill him, Howe noticed that their spears had holes near the *point* and not at the blunt end. He awoke, and the possibility of such a needle came to him. He later carried out the idea presented through the dream, and made a needle with the thread hole near the point. The machine stitched!

SUCCESS OF THE IDEA

But success was not yet in his hand. Although the machine had succeeded, the inventor, now almost penniless, could find no one to back him financially. He was forced to take a temporary position as railway engineer in order to earn his living. A short time later he went to England, tempted by an offer for the purchase of the English rights to his patents. However, England was evidently not yet ready for the invention and Howe again returned home without results.

He had pawned his model machines to get his passage home. To make matters worse, he found on his arrival that other machinery companies were infringing on his patent, and were putting sewing machines on the market. But Howe's misfortunes were nearly at an end. He borrowed money, brought suit against those who had infringed on his patents, and won the decision. From that time, his future was assured. At one time, it is said, his royalties amounted to $4000 a day.

There is a story told that during the Civil War, while Howe was enlisted as a private in the Union army, the paymaster was slow in arriving on one occasion. Howe disappeared from camp and later returned with a large box. He opened it, and paid off the whole regiment. Fortune was kinder to Howe than to many other of our great men — he lived to enjoy the full success of his invention.

EARLY RISE OF SHOE BUSINESS

Prompted partly by these early mechanical inventions, and more especially by the great gold rushes, the shoe industry in 1849 took a great forward stride, never before dreamed of. Large quantities of shoes were turned out for the men who went into frontier work. Men were carried away with excitement by the great "gold fever" that possessed the country as the result of the rich strikes in California and Australia. Those

who could not go themselves "staked" others to prospect for them. This created a tremendous demand for boots and heavy shoes to be used by the prospectors and miners.

CALIFORNIA SHOE STORE IN 1851

An example of the enormous shoe business is seen in the record of a man named Joe Wales, who in 1851, opened a store in San Francisco. His business increased so rapidly, that in a short time, he was handling the output of twenty eastern factories. Of course a shoe factory in those days did not represent a very large organization, but nevertheless the fact that this one man was able to contract for the output of so many shoe factories indicates that there was a substantial local demand. The shoes were sent to him in boats all the way around South America and the payments were made in bags of gold dust. Some of the cloth bags have been preserved, and they bear the mark of $20,000 on the outside. This business was on no small scale.

USE OF HOWE MACHINE FOR LEATHER WORK

From this time on inventions were introduced in overwhelming numbers. We shall consider here only a few of the more important ones. In 1851 John Brooks Nichols, a young shoemaker of Lynn, adapted the Howe sewing machine for the stitching of uppers. Nichols bought up twenty-five machines from the first of those pro-

duced by I. M. Singer & Co. Following this he set up a shop in Boston and established a stitching business. He believed that there was a great future in the sewing machine, and saw no reason why it could not be made to stitch leather.

As it was, the hole made by the needle was larger than the thread. Consequently the seams in the shoe were loose and the stitches coarse. The young man experimented with needles and thread until he succeeded in finding a combination that would stitch leather. I. M. Singer & Co. put his invention on the market and sold to three Lynn manufacturers the rights to use the machine for stitching leather. Nichols was paid the generous sum of three dollars a day to go about from one factory to another instructing the operators.

BLISS, HOWE & NICHOLS

Shortly after this, Nichols joined interest with Howe and one of Howe's associates named Bliss. They formed a company to put a machine on the market, called the Howe Improved Machine. It was built on designs prepared by Nichols. The company held practical demonstrations in their stores to show the sewing of leather. The idea was found to be workable and soon the machines were introduced generally among the shoe factories.

As we have already learned this sewing of the uppers, which at the time was called binding, had formerly been done by hand, and much of it was done as piece work at home. The introduction of the sewing machines had the effect of establishing shoe manufacturing as a distinctly factory industry and did away with "home" work.

McKAY MACHINE

The invention of the *McKay sewing machine* in 1858 marked a new era in the history of shoemaking. In every sense it revolutionized the American shoe industry; for at the outbreak of the Civil War shoes were so scarce that Congress considered lifting the protective tariff in order to encourage the importing of foreign goods. If the tariff had been raised at that time it is quite likely that foreign shoes would have forced our industry to the wall, for the time being at least. The McKay machine appeared at exactly the moment when it was most needed to replace manual labor.

BLAKE'S INVENTION

Lyman R. Blake, the inventor of the McKay machine, was born in South Abington, Massachusetts. He had saved about $1400 from his wages in shoe factories, and when he was twenty-one he invested this in a shoe manufacturing firm in which he later became a partner. He

conceived the idea of developing a machine that would sew the uppers to the soles on the same principle as the Howe machine sewed the various parts of the uppers together. His partners considered this a wild dream, but Blake continued in his efforts and at last, in 1858, produced just such a machine.

This, however, proved to be too great an undertaking for Blake's very limited resources and in consequence he sold out completely to Colonel Gordon McKay. Although McKay was himself not an inventor, he was the man of foresight and capacity needed to develop the machine's possibilities into a commercial success. This he did against great obstacles.

It is to the point to mention here that the efforts of Colonel McKay to interest capital and shoe manufacturers in the production of the machine met with so little real encouragement that he was literally forced to develop and utilize the *royalty system*. Although the early manufacturers would not consider purchasing the new machine they were willing to consider the royalty plan of compensation whereby a certain small fixed charge was made for each pair of shoes turned out on the machine. This system, by the way, is still in vogue and is an important factor in present-day factory economy and maintenance.

Continued effort on the part of both McKay and Blake finally brought the machine to a point

of practical usefulness and in 1861 the first McKay machine was introduced in the factory of a Lynn manufacturer. It proved an entire success — and none too soon. The Civil War had broken out and the demand for serviceable shoes was urgent. The machine-sewn shoes were certainly welcomed by the soldiers for they were almost barefoot by the time relief came in the form of the new style machine-made shoes.

WELT SEWING MACHINE

In 1861, August Destouy, a New York mechanic, invented a machine with a curved needle for attaching the soles of turn shoes. He sold his patent to James Hanan, who later interested Charles Goodyear, an expert machinist, and, by the way, a nephew of the famous Charles Goodyear who made such wonderful discoveries in the vulcanizing of rubber. Besides Goodyear, there were as many as eight expert machinsts who worked to perfect the new type of sewing machine for shoes.

The outcome of all the experimenting with Destouy's original machine was the invention of a welt-sewing machine which now bears Goodyear's name — the *Goodyear welt machine*. This was later perfected for general use about 1890. From that time on the old-fashioned method of attaching soles of fine shoes by hand, which had been in use for centuries, was almost entirely supplanted by the welting machine.

Edge trimming and *heel trimming* machines were introduced around 1877, and immediately began to play an important part in shoe manufacture. Previously, hand trimmers or "whittlers," as they were called, performed this task and received very high wages, sometimes as much as double those of the lasters, who were always highly paid. Needless to say, there was at first considerable opposition to the machines. However, saving of time, the reduction of physical effort in making good shoes, and the uniformity of the work produced by the machines, soon established them in their place of prime importance in shoe construction. And labor soon learned that skill was required to operate the machines and that high wages were to be had for machine work as well as for hand work.

LASTING MACHINE

In 1883 the idea of a *lasting machine,* one of the very important shoe machinery inventions, was revolutionized by Jan Ernest Matzeliger, a mulatto who had come to Lynn from Dutch Guiana. The machine was nicknamed "nigger-head" after its inventor. Matzeliger was the son of an expert engineer and was himself a practical mechanic. In a Lynn shop he learned to operate a McKay machine. While there, he heard the remark that no inventor could produce a machine to do the work of a laster unless he

could make a machine with fingers like a laster's, — and, of course, it was said at the time, "such a thing is impossible."

Matzeliger took up the challenge. He set to work secretly and studied and labored in all his spare time. But his secret leaked out, and on every side he met with jeers and ridicule. His first model, poorly constructed of bits of odds and ends, was a failure. Likewise his second model failed. The third, however, was so successful that in 1883 he was advanced money to build a fourth. He died before this model was completed but other machinists were able to perfect it. Some idea of the importance of this machine from the standpoint of saving physical effort, may be had when it is considered that on the old basis the hand worker lasted perhaps fifty pairs of shoes a day; the machine operator can now last from 300 to 700 pairs in a working day.

PULLING-OVER MACHINE

The *pulling-over machine,* invented early in this century, is an example of one of the highest developments of shoemaking machinery. Years of effort have been spent on the perfecting of this machine and over a million dollars have been expended on its development. The pulling-over machine prepares the shoe for the lasting operation which follows. It centers the upper upon the last, draws the sides and toe into place with

pincers and temporarily fastens these parts with tacks for lasting. It is conservatively estimated that this mechanical device means to the shoe manufacturers of the United States a saving of $4,000,000 per year.

RELATION OF PROGRESS TO MECHANICAL INVENTIONS

It seems hardly necessary to mention the fact that mechanical invention since 1840 has revolutionized the shoe industry. The mere naming of the inventions tells the story itself. The interesting point to be noticed is that most of the important shoe machines have been invented by the workmen themselves; frequently after long toil and study. Since 1836, when the United States Patent Office was established, over 7000 patents on shoe machinery have been granted. And new patents are constantly being presented. The field for further development is without limit. It is to be hoped that the present century will continue the splendid work of invention and development that has stood out so prominently as a result of the effort of the nineteenth century.

OPERATIONS OF MANUFACTURE

In the manufacture of a shoe today, there are sometimes as many as 170 separate machine operations performed. This is in addition to the dozens of hand operations also required. It

is found that in some instances a shoe passes through as many as 210 pairs of hands in the factory. About 300 different types of machines are used in the manufacture of all kinds of footwear, and in specialties the number of processes is greatly increased.

The remarkable work of the past generation could never have been accomplished had it not been for the constant development and standardizing of machinery and processes, and the close co-operation between the manufacturer of shoe machinery and the shoe manufacturers themselves. The growth of the industry in the last twenty-five years has far surpassed that of all former periods.

An event of first consequence in the history of the development of mechanical shoemaking was the consolidation, in 1899, under one management, of many varying systems, of major and minor machines, into a single large organization for producing and developing the co-ordinated system of machines for the various types of shoes. From that point on the history of American shoemaking machinery has been one of great progress and development to the point of world leadership.

It is significant that the three greatest single figures in the development of shoemaking machinery in the United States were not inventors at all, but organizers. These three men were: Gordon McKay, Charles Goodyear and Sidney W. Winslow.

CHAPTER IV

LASTS

MAPLE-WOOD

From the densely wooded hills of northern Michigan and the forests of Maine, we get much of the maple wood used in making millions of lasts annually for the American shoe industry. Upper New York state also contributes a goodly share of the timber required for this purpose.

The *last* is the carved wooden form or model which determines the size and shape of the shoe. Because of the very strenuous uses to which it is exposed in the shoe factory, the last must be made of fine, hard, straight-grained wood. Many years of experimenting have taught the manufacturers that maple is the only suitable wood available in this country. In England beech wood is used for last-making and some of the more conservative shoemakers still cling to the old-fashioned iron form.

SERVICE OF THE LAST

It is well for the retail shoe salesman to have in mind the distinction between the one type of last as used in the manufacturing process for

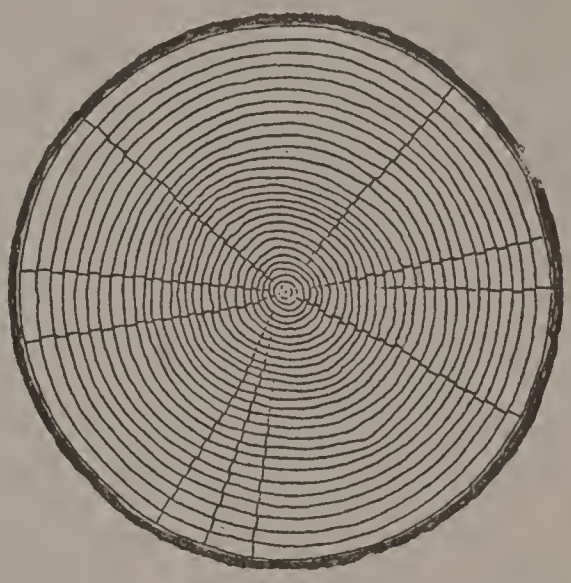
forming the shoe, and the other type mainly used for display purposes in the store to preserve the style lines of the shoe. The display last, usually made of bass wood, is a sort of "dressed-up" member of the family. Its principal duty is to make a good appearance and at the same time perform the light duty of holding the shoe in shape. However, it is not called upon and is not made to do the heavy work of a factory last.

To the person who has had no actual experience in the making of a shoe it is difficult perhaps to realize the importance of a good hard last. The average shoe remains on the last from three days to a week or more, and the real shaping of the shoe as well as a great part of its making is done during that time. It is imperative that the wood be rigid enough to retain its shape during all of the operations. In fact, the last serves as an anvil on which the shoe is hammered and stretched into form and unless it is sufficiently hard to withstand this usage, the result will be a poorly shaped shoe. Not only must the last be made of hard wood, but the wood must be dried and shrunk with greatest care. Otherwise the last will shrink or warp and succeeding pairs of shoes made on the same last will not be up to the standard in size and shape.

SHRINKING AND CHECKING OF WOOD

Everyone is familiar with the cross-section of a log which shows a series of rings, one outside

the other, spreading out from the central core. These are called *annular rings* and occur in number according to the age of the tree, one for each year. These rings represent the grain of the wood and constitute the part that gives hardness. The portion between the rings is softer and more or less sappy and it is here that the shrinking occurs. With this in mind, it will be readily understood that the hardest part of the tree and therefor the most suitable for last-making is the oldest part near the core where the rings are close together.



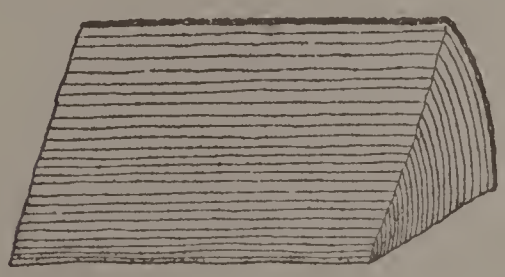
Examination of an old tree stump will also show a number of lines that extend out like sun-rays from the center. These are called *medullary rays* and are the veins through which the sap circulates in the growing tree. If wood is not properly dried, it is likely to crack along these lines and along the line of soft space between the annular rings. This is called *checking* because the cracks become formed in a criss-cross fashion. Manufacturers have been experimenting for years in an effort to find a method of drying wood which will eliminate the danger of checking. Much of this danger has been overcome

by the application of scientific principles in caring for the wood from the time the tree is cut until it is ready for the shoe factory.

PREPARING THE WOOD FOR LAST MAKING

The winter months are chosen for felling the trees because the sap runs more slowly during cold weather and the wood, therefore, dries more readily and shrinks less. Large crews of expert woodsmen are employed to brave the rigors of the northern winters and search the snow-laden forests for trees that are particularly free from knots and other blemishes.

After the trees are felled they are hauled to the mill and thrown into an artificial pond. This pond usually resembles a large cement swimming tank and has steam pipes running through to keep the water from freezing. After the tree trunks have been thoroughly washed they are taken into the mill where the bark is removed. The logs are then sawed into lengths a few inches longer than the different sizes of the shoe lasts to be manufactured. These lengths are split up into triangular blocks, called spokes. The number of spokes obtained from one length depends, of course, upon the thickness of the tree.



Up to this point the procedure for preparing

the wood is practically the same among all last manufacturers. Although they do not all have the artificial pond, the wood is cleaned by some similar method. There is considerable variation, however, in the manner of treating the wood after the spokes are cut. It will be best for our purpose to consider the two methods most commonly used. The older method, which is still used extensively, consists of air drying followed by kiln drying with hot air.

AIR DRYING

As a rule the spokes are cut, or, as the process is called in the factory, they are *rough-turned* on a lathe to remove all surplus wood. The lathe is a simple machine that holds the spoke and revolves it while a sharp-edged tool cuts into the wood and gives it a crude resemblance to the last, as shown in the first photograph of the group on page 73. The rough turned blocks are placed in a shed for air drying. The dry-shed is built so that the air can circulate constantly from side to side and from the floor up to the roof. When treated by this method the maple blocks require from six to nine months in the drying shed before they are ready for the dry-kiln. From this it may be well imagined that there is always a considerable amount of capital tied up in high-priced lumber during the long period while it is in this process.

KILN DRYING

There are many different types of dry-kilns. The old-fashioned kind operates with dry hot air. This is the type that is generally used to complete the drying of blocks that have already been in the dry-sheds. The kiln is constructed with air chambers on four sides and a ventilator in the roof. As a rule, the floor is built three or four feet above the ground and is made of slats with spaces between, something like a grate. Steam pipes are arranged under the floor in order that the hot air may rise and circulate freely among the blocks. The heat must be applied gradually, beginning at a normal temperature and slowly but constantly increasing week by week until the blocks are completely dry.

The success of this sort of kiln drying is largely dependent upon the skill of the man in charge. Expert judgment must be shown in regulating the heat if the best results are to be obtained. Changes from day to day in weather conditions, both as to heat and cold and also the amount of moisture in the air, affect the temperature in the kiln. Accordingly the artificial heat within must also be adjusted.

The blocks usually require three months of treatment by this process. This, it should be noted, is in addition to the six months or so given to air drying. It is often over a year from the time the tree is cut until the blocks are dry. If

the heat has been increased too rapidly or allowed to drop suddenly the blocks will very likely become checked or warped. In either case they will be useless for last-making purposes.

KILN DRYING WITH STEAM AND HOT AIR

The United States government has for years conducted an experiment station in Wisconsin for testing methods of drying lumber. Although the results of these tests brought out the fact that moisture control is just as important as heat control in the dry kiln, manufacturers at first were slow about applying the new principle. It is an established fact that lumber dries quickly when the air contains the most moisture. In the effort to improve wood drying for airplanes, hundreds of tests were made and it has been found that if a very high degree of moisture is maintained in the dry kiln, wood will dry much more quickly and with better results than had ever before been considered possible.

Working on this principle, makers of dry kiln apparatus have introduced appliances to supply steam under exact control. The steam faucets are operated by hand but the heat is automatically regulated by an instrument that is connected with a valve in the steam line. This attachment can be set for any desired temperature. If the heat in the kiln rises one degree above the set point, the valve controlling the steam supply closes, thus preventing the air from

becoming heated too much. If, on the other hand, the heat drops one degree below what is desired, the valve action is reversed and hot air is admitted until the temperature has returned to the degree indicated on the instrument.

A record of variations in both the heat and moisture is obtained by the use of a wet-and-dry bulb recording thermometer. This instrument is equipped with two tracing needles, one controlled by the wet bulb and the other by the dry bulb. All variations shown by the thermometer are recorded on a chart by these needles. The dry bulb records the degree of heat and the wet bulb shows the degree of moisture.

Air circulation in the kiln is maintained by means of a revolving fan and an arrangement of air spaces and ducts. This keeps the air moving in a uniform volume continuously so that it does not have time to be chilled by contact with damp wood.

All this may seem far removed from the retail shoe salesman but it shows something of the great effort made to produce shoes that will be perfect in every detail. Better lasts mean better working equipment for the shoe manufacturer, and this in turn means more desirable and more serviceable shoes for the customer.

Many progressive manufacturers have installed in their mills this type of high humidity kiln with the automatic temperature control, for drying the rough-turned maple blocks. The re-

sults are generally considered to be extremely satisfactory. In fact, it is claimed that drying which formerly required nine to twelve months can now be done in as many weeks. By this method the green wood can be placed directly in the kiln without any previous air drying. The saving of time and labor is such a considerable item that it is safe to conclude that within a few years the old-fashioned dry air method of treating the wood for last making will be entirely discarded for the high humidity system, as above described. Another great advantage in this method is the fact that the operator can tell at any time the amount of moisture still remaining in the blocks and from this can estimate the time required to complete the drying. When the blocks are taken from the dry kiln, they are ready to go to the last maker.

USE OF PETROLATUM

One of the most recently discovered methods of treating wood to be used for last-making purposes is that of dipping the block in a solution of rosin and a crude oil product known as *petrolatum*. The latter is a thick, waxy matter obtained by removing the lighter oil substances from petroleum. Both the rosin and petrolatum are mixed with gasolene to form a lighter solution, and it is into this that the wood block is dipped. After it has become thoroughly saturated it is taken out and allowed to dry.

The principle of this process is that the oil products work through the block and displace the moisture. The effect is one of removing the moisture, which is the chief cause of expansion and contraction in the wood after it is made up into the last. At the same time the moisture is replaced in the cells of the block by the pertoleum mixture which is not affected by changes in the temperature or by moisture in the air. This process also adds to the durability of the wood.

The most severe tests have been made with blocks treated in this way and in each instance the results have been favorable. Even the extreme tests of soaking a block in a bucket of water and of placing it over a warm radiator have resulted in a change in measurement of only a fraction of an inch. This process is mentioned especially because it represents a great forward step in doing away with the expansion and contraction of lasts, which has always been a problem of shoemaking. It is probable that as this method comes into more general usage it will bring about a closer standardizing of footwear sizes.

THE MODEL LAST

The designer in a last factory is the man who creates new shapes in lasts. When the designer receives an order for a new style of last, he draws a design to meet the ideas or specifications as

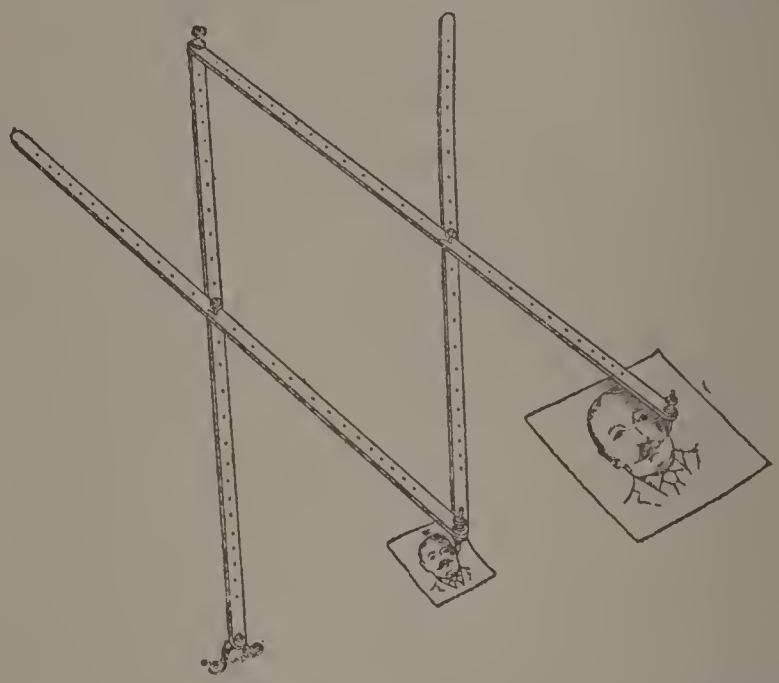
given by his customer. This, along with measurements and instructions, he sends to the *model last* maker. It is the work of the model maker to reproduce the design in wood according to the directions he receives from the designer.

If the new design is something entirely different from previous styles, then the model must be carved by hand. But if the design is only a slight variation of an older style the model maker may take an old last and build it up with bits of leather or he may shave one down until the desired shape is obtained. After the model last has been prepared, the work of making other lasts from the model is a matter of machinery.

Before sending the model into the factory, the model maker puts tacks in the last at all points where measurements are to be taken. A row of brass-headed tacks is also driven around the edge of the bottom in such a way that the heads can be hammered down and filed off to make a metal binding. This is to prevent damage to the sole line. It will be readily understood that keeping the sole line undamaged is a matter of great importance, for the reason that the inner sole pattern of the shoe is usually taken from the bottom of the last. In fact, several sole patterns prepared from paper are cut in all sizes, and these patterns travel through the factory with the lasts, to be used after each machine operation for testing the size of the sole.

THE LAST-TURNING LATHE

After the model last has been completed, it is sent with the paper sole patterns to the factory superintendent or his assistants who make out the necessary order slips and then send the model to the operator of the *last-turning lathe*.



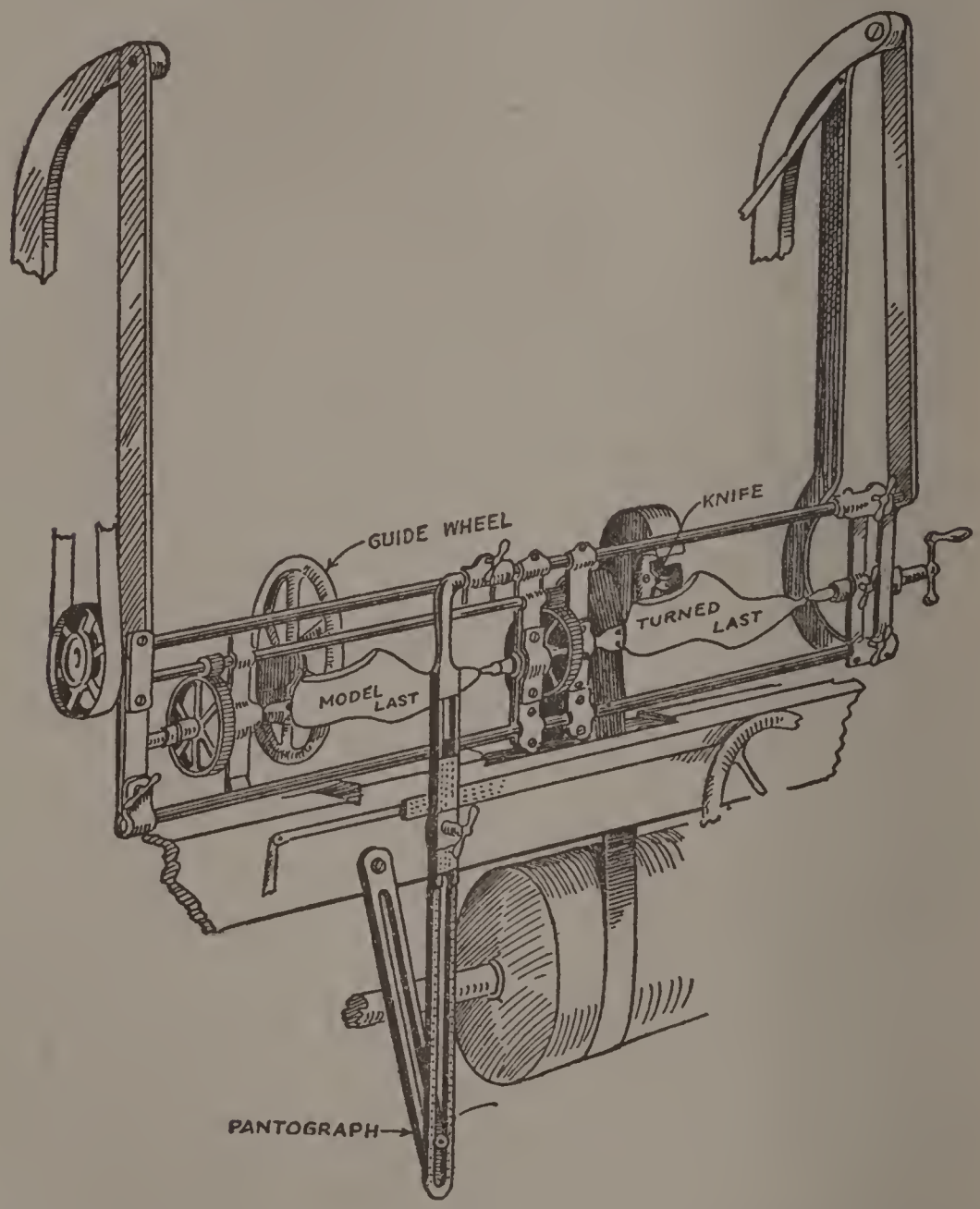
This machine works on the *pantograph* principle. In fact, all grading machines, that is all machines that can be adjusted to cut different sizes and shapes, operate on the same principle. For the benefit of the reader who may not be entirely familiar with the pantograph, a brief description will be given at this point concerning the manner in which this instrument is operated. The person who understands the principle of the pantograph will have a fair knowledge of how the various sizes and widths are obtained in making lasts and patterns.

The pantograph is a simple instrument used in mechanical drawing for reproducing designs. It can be adjusted to trace larger or smaller reproductions. The instrument consists of four arms or levers, as shown in the illustration. The arms are connected by hinge-joints so that they can be spread apart or pulled together. Two of the arms are measured off into inches and fractions of inches the same as the ordinary desk ruler. There are two clamps in which a pencil and a tracing point can be inserted. These clamps can be adjusted by sliding them along on the arms where the rulings are indicated. This provides for reproducing the original in various sizes, as required. The design to be reproduced is placed under the tracing point and the paper on which it is to be copied is placed under the pencil. The tracing point is moved by hand along the lines to be copied, and the pencil then automatically traces a similar figure.

Many changes have been made in adapting the pantograph to various grading machines but the principle remains the same. In the last-turning machine a knife or cutting wheel is substituted for the pencil and a small guide-wheel is used instead of the tracing point. This makes it possible to trace around the entire surface of any solid object that may be revolved against the wheel, instead of merely tracing on a flat surface. The machine is operated by power.

At the front of the last-turning lathe there is

an arrangement called a *rocker-arm*. This can be best understood by a close observation of the illustration. The rocker-arm is the means by



which the model last and the rough-turned maple block are held in line and revolved. The model last is fixed in position at the tracer end, that is, in front of the guide-wheel. The rough-turned block is fixed in the cutting end. This is the

UPPER FIGURE — Illustrates the Rough Turned Block
CENTER — Half-Turned Last
LOWER — Full-Turned Last, Showing Heel and Toe Knobs.

end that corresponds to the pencil arm in the original pantograph. Instead of the pencil, however, we have in the last-turning lathe a revolving knife.

When the lathe is set in motion, the revolving model-last is pressed against the guide wheel and the rough wood block is revolved against the cutter. The cutter digs into the wood and reproduces the surface that is being traced by the guide wheel. The second of the group pictured on page 73 shows a last half-turned from the rough block. In this way, the crude block of maple is carved into a duplicate of the model last. The latter is usually size 4 for women's shoes and 7 for men's shoes. By adjusting the indicators on the dials, any length size can be turned or cut from this one model. A separate model is, however, required for each width size.

It will be recalled that the model maker in preparing the original last placed tacks in the model at points where measurements were to be taken. The turning-lathe does its work so accurately that the head of the tack is reproduced, standing out like a small wart on the wood. These little bumps serve as guides to be used in succeeding operations. As it is necessary for the model and the block of wood to be held at both ends on the rocker-arm, the turning lathe cannot shape the extreme ends of the toe and heel. The third photograph on page 73 shows

the last as it comes from the lathe, with a knob at each end.

At this stage of the manufacturing process the bottom of each last is measured out on a paper sole pattern to make sure that the size is correct.

SHAPING THE HEEL AND TOE

From the last-turning machine the partly formed last is passed on for shaping of the heel and toe. This part of the work is done on what is called a heel-and-toe machine. Small pieces of iron that have previously been cut in the exact shape of the heel and toe of the model last serve as models or guides for the cutting knife. This heel-and-toe machine also is equipped with a revolving knife and works on the pantograph principle. The first picture in the group on page 79 shows the last with the heel and toe shaped.

After the heel and toe of the last have been shaped, the bottom is once more fitted on the sole pattern to test its shape and size.

THE ARNOLD HINGE

There have been many devices in use to make possible the removal of a last without difficulty after the shoe has been completed. The object is to prevent stretching of the leather and impairing of the shape that the shoe has acquired from the last. One of the most popular of such devices is the Arnold hinge which is applied to

the last after it has been completely shaped. To insert the hinge, the last must be cut in two. One of the little tack bumps shows the location of the hinge. A V-shaped portion is cut out of the instep and the two parts are joined by imbedding the hinge. The second of the group on page 79 shows the last with the hinge in place. This makes it possible for the heel to be turned upward as shown in the third picture of the group. Expert workmanship is required in inserting the hinge so that the size of the last will not be affected.

HEEL AND BOTTOM PLATES

If the last is to be used in making a shoe that has the sole attached by tacks it is necessary that the last be provided with an iron plate on the bottom. This serves the purpose of clinching the tacks as they are driven in. As will be fully explained and illustrated later, tacks are employed in making shoes by the McKay process and although the soles are later sewn by machine, the tacks still remain. Therefore, lasts to be used in the manufacture of McKay shoes must have the iron plated bottom. In making shoes by the Goodyear welt method, the heel is the only part that requires nailing. Accordingly, lasts to be used for this work have iron plates over the heels only.

After the necessary iron has been attached at the bottoms the lasts are passed on to the next process in the scouring room.

SCOURING

There are three operations employed to give the last its smoothness. The first is called *roughing* and consists of scouring with a coarse grade of quartz. The operator of this scouring wheel is very careful to avoid sole lines, insteps and toes, for the reason that the quartz is much too coarse for use on the finer curves.

The second operation is *medium grinding*. This is done with a finer quartz and covers all parts but the toe of the last.

For the third grinding, a very fine quality of quartz is used and the entire last is scoured.

The last is made one-sixteenth of an inch larger than necessary to allow for scouring and finishing. Inspection and measuring is done after scouring to make sure that each last conforms to the model.

The finishing of the toe requires very skilled workmanship. Any variation in the toe of a last produces a very noticeable difference in the finished shoe. It is important, therefore, that all toe shapes be exactly uniform, in supplying a shoe manufacturer with a quantity of lasts of any given style.

FINISHING AND POLISHING

Details of finishing differ among last manufacturers but the usual treatment is an application of one or two coats of shellac followed by

UPPER FIGURE — Last with heel and toe shaped
CENTER — Finished Last with Arnold Hinge
LOWER — Hinge up-turned showing shortening in length of the Last.

a coat of wax. The wax is applied by means of a leather buffing-wheel and gives a good luster as well as a fine, smooth finish. This polished surface is essential in order that the last may be readily slipped in and out of the shoe. It also prevents the lining from sticking to the wood.

It is becoming customary to stain the lasts with different colors to indicate sizes and widths. For instance, green may be used for size 4, blue for size 5, and so on, while the widths may be shown by stripes in other colors such as, red for C, yellow for D. This schedule of colors lessens the chance of errors in the shoe factory. Thus, an operator who is working on a green last with a red stripe knows that it is a 4-C, even if the size number is covered. It is understood, of course, that separate lasts are made for both the left and right foot.

When the color has been added and the size, width and style numbers have been stamped on, the lasts are sent to the shipping room.

LAST MAKING AS AN INDUSTRY

With the great strides that have been made in the progress of the shoe industry, last making has become an independent business and large last factories are in operation in most of the great shoe districts. The extent of the industry can best be realized when one considers that some of our shoe factories turn out from ten to twenty thousand pairs of shoes daily. Each one

of these shoes must, of course, be made on a last. About sixty shoes can be made on a last before it becomes deformed. Sometimes old lasts are returned to the last factory and are remodeled.

The output of a representative factory is from 200,000 to 400,000 lasts, or more, annually. When a shoe manufacturer is making up the costs of his shoes, the average amount charged to the cost of lasts is five cents a pair. This seems a very small amount indeed when one thinks of the great number of hands that have worked on the wood since the winter day when the maple tree started on its journey from the forest to the busy shoe factory.

ALUMINUM LASTS

In the manufacture of rubber footwear it has been found practical to use lasts made of aluminum. Rubber footwear is required to be vulcanized on the last and consequently the use of metal is an advantage in that it is not affected by the heat in the vulcanizing oven. However, in the making of leather shoes, or any other kind where rubber does not form a part, the aluminum cannot be used to advantage. There is a great volume of rubber footwear and combinations of fabric and rubber shoes made over the aluminum last. In fact, the opinion is expressed by some manuufacturers that this kind

of last is to be preferred for such types of light work.

The matter of making the many kinds of canvas-top footwear with rubber soles and heels, rubber boots and rubber overshoes, is principally one of hand work in assembling the parts to make the finished shoe. There is no nailing and practically no hammering to be done after the parts are brought together to be formed over the last.

LONG-WEARING LIFE

For work of this character one of the great advantages is that the metal will stand the wear and tear of factory usage more permanently than will one of wood. In the process of handling the wooden last will sooner or later become cracked or chipped whereas the aluminum will withstand the same sort of treatment without much injury. Then too, there is the matter of change of style to be taken into account. It is a rather simple matter to take the old metal lasts representing styles that are out of date and have them melted for use in making other lasts of modern design. The loss in this case is principally that of the original cost of making — the metal continues with practically no loss.

There is no comparison between the wooden last and the metal last. Each has its own special field of usefulness. The fact that the wooden

last has a comparatively short wearing life may be considered an advantage in one sense because it makes possible the introduction of new footwear styles without any great extra expense to the manufacturer. If the last had an indefinite wearing life there might be the possibility of a manufacturer hesitating to throw out old styles because of the expense involved in doing so. However, when a last wears out naturally there is no special problem replacing it with one of a new style whenever the need for it arises.

CHAPTER V

PATTERNS AND STYLE CREATIONS

THE DESIGNER'S FUNCTION

Styles are determined and developed not by any one man or group of men, but by the team work of the whole shoe trade. One man may be called the shoe designer, but in reality he is merely an interpreter for the entire trade. His problem is to know the situation from the leather market to the whims of the average customer and to harmonize all of the factors into a design for a group of attractive and appropriate shoes.

The interpreter or designer of footwear styles is of like importance to designers of the ever-changing fashions in other classes of wearing apparel, for example, millinery and gowns. It is his special business continually to keep in touch with the trend of fad and fashion. According to his ability to interpret the popular demand and to express it in the form of footwear style a large measure of his success as a designer is determined.

He is, to be sure, assisted very greatly by suggestions that come to him from people who are in close touch with the trade. His problem is

not one of creating styles out of pure imagination. The factory designer often receives valuable suggestions from traveling salesmen who call on the retail trade. These men are continually on the watch for new ideas in style and fashion, and in well-managed organizations provision is always made to bring this information to the attention of the designer.

STYLE TENDENCIES

Furthermore, in his effort to interpret future demand, he studies the old styles and attempts to decide upon the continued popularity of different patterns. The average designer may find it necessary to be familiar with something over 25,000 styles. Also, in planning his work he finds it necessary to consider the popularity of new styles as shown by the current sales and reorders of shoe retailers throughout the country. The continuous changes made in dress and costumes, both here and abroad, also have an influence. Constantly the designer keeps informed of fashion predictions from Paris. This provides him with a very helpful source of information. The popular demand of fashion calls for a proper harmony of style in the whole attire from the hat to the shoe, and every retail shoe salesman knows from experience that the shoe is not the least consideration of the average customer.

The designer will also make himself familiar with the product and style ideas as developed by

other manufacturers. Department heads in his own factory, as the result of their daily association with the trade, are often able to furnish practical suggestions.

The maker of shoes, who through his designer plays his part in the making of styles, bears in mind that he is only a cog in the wheels of the trade, and he tries to keep moving in harmony with the rest of the machinery. He keeps in mind a ready reference of his own experience and the experience of his predecessors in the making of styles. He reads reports of the tanners and of the hide markets to learn what new leathers may be coming or what familiar leather may be passing, as did kangaroo skins some time ago. From retail dealers he learns whether customers want slim toes or wide toes, high heels or low heels, button boots or lace boots. He studies the trade papers and talks with his friends and associates in the trade to learn what new things might help him in designing new patterns or in making shoes. In fact he must keep posted not only on national events but those of international importance. As has previously been mentioned in the volume on "Materials in Shoes" enormous quantities of hides and skins are obtained from foreign countries throughout the world. Current conditions in each country and the relationship of one country to another are indeed matters of importance and concern.

All this information, past and present, the designer boils down in his own mind, adding a bit of his own originality to give the proper spice, and from the top of the boiling kettle he skims the ideas that he later develops into new styles in footwear.

FAR-REACHING INFLUENCES

In times of a probable change in domestic political power the designer asks if a change in tariff will affect his styles. He takes a glimpse around to see if short skirts or long skirts are the fashion. He knows from experience that the longer the skirt the lower will be the shoe uppers, and this in turn may require a change in the whole range of styles. He also observes if heavy or light apparel is being worn, for when coats are light and snug fitting, so are shoes. He looks about to see if there are new styles of laces, eyelets or buttons on the market, or if the style of buckles has been improved, because it is as sure as fate that the prettiest fastenings will sell best. All the while he keeps his eye on the general development of style, forecasting the changes and getting ready to meet them. He knows that unless he prepares to meet the changes he will find himself loaded down with stock that will not sell.

Even upon that slow process of the changes of the size of feet, the designer must change his sizes accordingly. Time was when shoes were

heavy with thick, square soles and stout seams. Shoes were big because coarse stockings were worn under them. These times of the daily bath, of silk stockings and with walking reduced to a minimum, feet are long and slim and B width shoes are selling where D sold before.

VARIETY OF DEMAND

Time was also when people had one pair of shoes for week day wear and one pair for Sunday best. Now there are shoes for work wear, for dress wear, for golf, for dancing, tennis, yachting, iron moulding, lumbering, fishing, for the first steps, for school, for growing girls, for old folks, and other shoes through more than a score of specialties, each of different leathers, lasts, patterns, lengths, widths and heights.

It seems a maze, this modern development of style in footwear. It would be a maze to Thomas Beard, the first shoemaker in America, with his stock of leather and his kit of tools, making shoes from house to house.

PATTERN MAKING

It is less than half a century ago, when shoe uppers were cut by hand from thin paper patterns very much as the parts of a dress are cut. As work of this kind increased in volume the patterns proved to be too frail for practical use and one ingenious shoemaker conceived the idea of having patterns reproduced in wood. As

an experiment, a set of paper patterns was sent to a cabinet maker to be cut in wood about a quarter of an inch in thickness. The plan proved so popular that within a comparatively short time the cabinet maker found it worth his while to establish a shop for the purpose of cutting wooden shoe patterns. His was the first shoe pattern factory in America, and the firm continued in business even long after wooden patterns were a thing of the past. These pioneer pattern makers contributed many innovations and improvements both in shoe designing and the perfecting of pattern machinery.

So great has been the scope of fashion's demands that pattern making has outgrown the shoe factory and is rapidly becoming an independent industry.

Although the larger shoe factories still have pattern making departments, many manufacturers nowadays obtain their patterns from independently established pattern factories. These concerns are usually designers also and submit new styles to the shoe manufacturers each season.

A very high degree of skill is required in the making of patterns. This can be readily understood when one considers that a flat piece of paper must be made to represent, to the smallest fraction of an inch, the exact area of the curved surface of the last.

In the preparation of a shoe pattern the work-

ing foundation is the *last*. When a manufacturer decides to produce a certain style of shoe, he has a last prepared and sends it with the design and instructions to the pattern maker. Or if the pattern maker has designed a new pattern, he makes up his model on a standard last, selecting the proper type of last for bal or blucher, as the case may require. As in last making, the standard sizes used in making models of patterns are size 4 in woman's and size 7 in men's shoes.

MARKING THE LAST

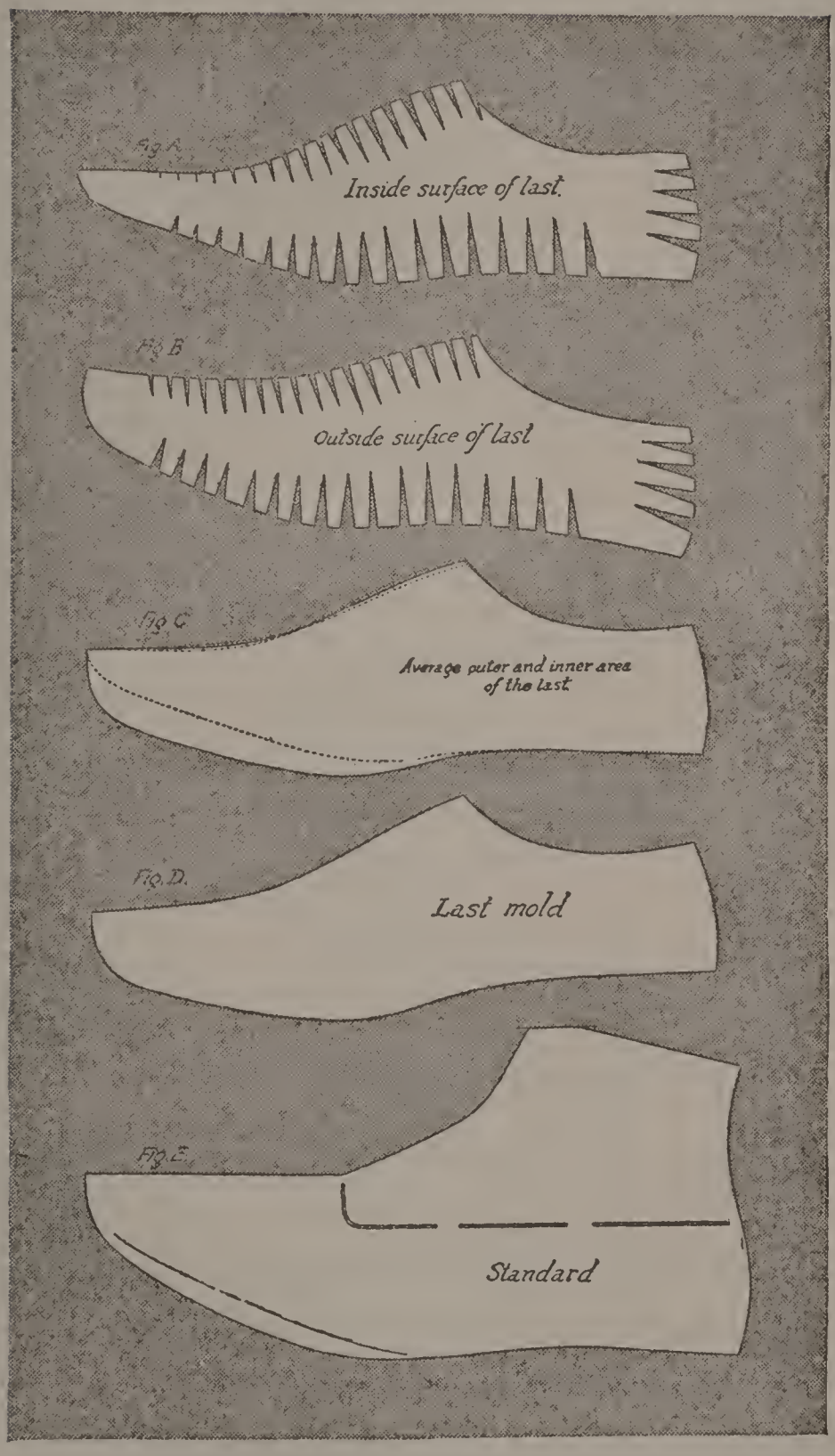
As a preliminary step in cutting a pattern the wooden last is pencil-marked to show the lines that are to serve as guides in getting the pattern. There are three sections of the last that are marked for this purpose. First, a line is drawn down the front or ridge of the last, passing over the highest point of the instep down to the toe. These two lines if extended would divide the surface of the last in half; the inside and the outside. The word *inside* is used to designate the side of the foot that is toward the other foot. Then a line is drawn around the edge of the bottom so as to outline the insole. It is important to remember these three lines as they figure prominently in getting the pattern. With these marks on the last to serve as guides, the pattern maker is ready to proceed with the interesting work of *taking off* the pattern.

THE LAST MOULD

The first operation in pattern cutting is called "getting the last mould." This is accomplished in three steps. First, the last is placed on its side on a piece of manila paper and the shape is traced with a pencil. In this way a simple silhouette or outline of the last is obtained. Two of these outlines are then cut out of the paper.

Following this, slashes in the shape of notches are cut, as indicated in Figures A and B of the accompanying illustration. For this operation, a very sharp knife is used. It requires great skill on the part of the workman for the slashes must be made in various sizes along a curved line. The worker after a time becomes very expert with this cutting and can do the slashing for a whole pattern in a minute or two without a misstroke. The purpose in cutting these slashes or *mitres*, as they are called, is to make it possible to fold the paper smoothly around the curved surface of the last.

Next, the pattern maker places the last again on its side and tacks one of these slashed papers to the last in such a way that it lies smoothly from the heel to the toe. Great care is taken not to twist the paper. The slit edges of the paper are folded over the last, one section at a time, and then, with a very sharp hard pencil, to avoid even the slightest enlargement in tracing, a line



"TAKING-OFF" THE PATTERN

These preliminary stages in pattern cutting and the functions of each are fully explained in the text matter.

is drawn on the paper at a point where it co-incides with the pencil lines previously made on the last. It will be recalled that these lines were drawn down the front of the last, down the center of the heel and around the bottom. By tracing these lines on the slashed edges of the paper and then trimming the paper along the pencil marks, it is possible to get the exact area of one side of the last.

The tacks used to hold the paper in position during the process are now withdrawn and the surface of the other side of the last is then obtained in the same manner. These two slashed pieces represent the entire upper surface of the last. It is not necessary to consider the sole pattern in this connection as that is usually supplied by the last maker.

CUTTING THE LAST MOULD

When the edges of the two papers are flattened out it is easy to see that the one taken from the inside of the last is much smaller than the one taken from the outside. Now the object is to get one piece of paper that will represent the combined measurements of both inside and outside surfaces. This constitutes the third step in getting the last mould.

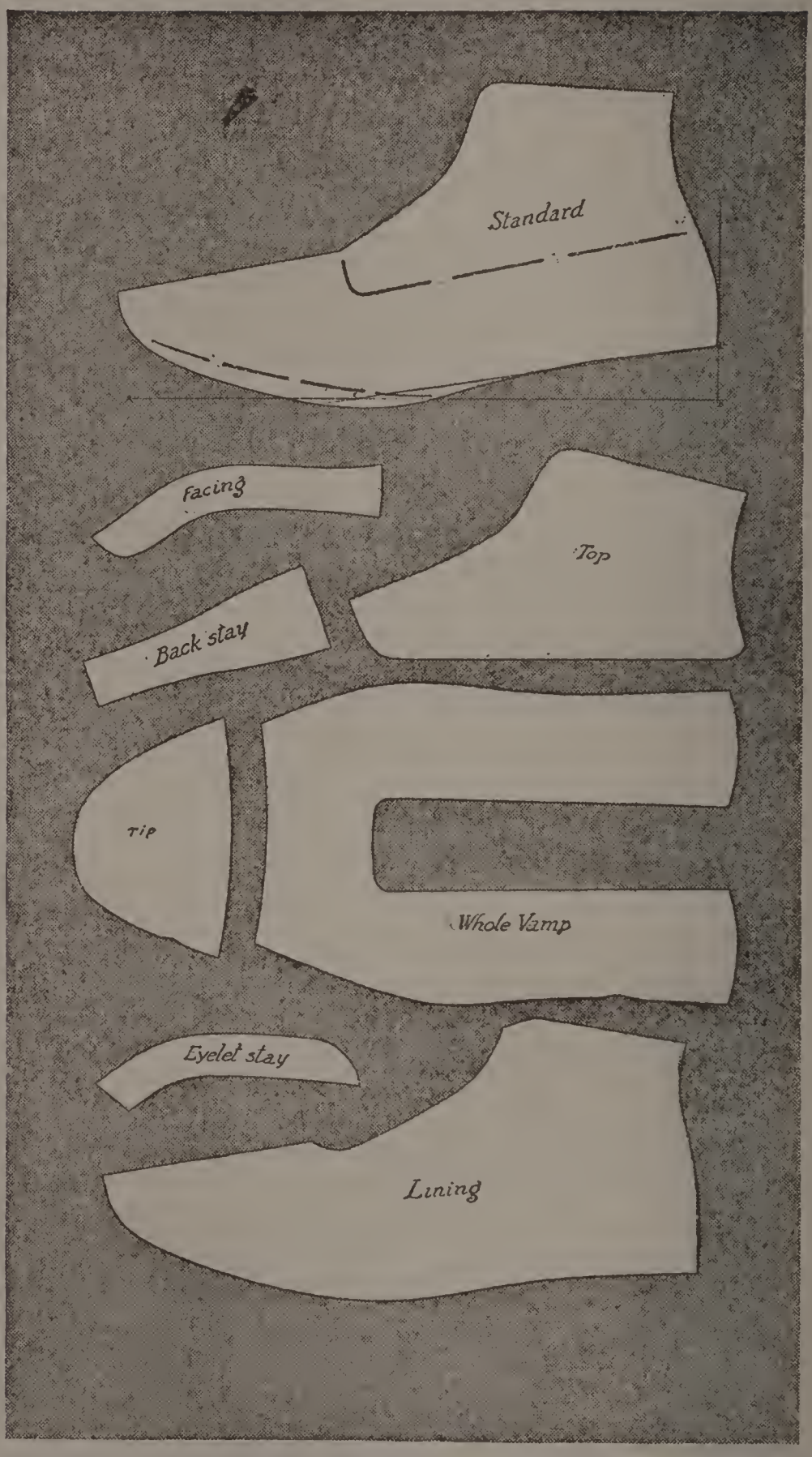
The two slashed pieces are flattened out on a piece of manila paper and traced one after the other in the same relative position. That is to say, the tracings are made one over the other

with the heel touching at the back seam and the bottom lines touching at a point about where the vamp seam would come on a bal shoe. The difference in sizes from these two tracings will be seen in Figure C of the illustration. With this as a working basis a line is then drawn half way between the inside and outside lines in order to get an average.

In cutting the paper, the average line is followed except at the bottom along the sole line. Here the cutter follows the larger curve of the outside, leaving the pencil marks to show the curve of the *inside*. This difference between the two sides is maintained and furnishes the means by which the inside and outside are determined in cutting the vamp apart. The piece obtained in this way is known as the *last mould*. (Figure D.) It represents the combined area of the inside and outside surfaces of the last. With this mould as a foundation, the pattern can now be developed without further use of the wooden last.

THE STANDARD

The shoe *standard* (Figure E) serves the same purpose in pattern building that the architect's blue print serves in house building. Just as the blue print shows the plan for the separate parts or rooms of the house so the standard gives the plan from which the *parts* of the shoe patterns are made. The "last mould" is



PATTERN "STANDARD" SHOWING HEEL PITCH. ALSO SEPARATE PATTERNS FOR UPPER PARTS

the basis of the "standard." To begin with, the mould is traced on manila paper, leaving allowances at the back for the seam and counter. An allowance is also made around the lower edge for the part of the upper that is to be turned under at the sole. The mould contains only the proportions for the lower part of the shoe as represented by the last. It is necessary, therefore, in constructing the standard, to draw the top or leg portion with pencil, according to certain scientific proportions. Close attention is given to the measurements in the ankle and the top.

The height of the heel is a determining factor in the designing of the top. This work must be very accurately done to give the proper *pitch* or balance in carrying the weight of the wearer. A "floor line" is drawn through a point which in a finished shoe, would be the center of the sole at the ball of the foot as shown in the figure by the line *a-b* of the drawing on page 96. Another line *c-d* is then erected at right angles to the floor line and passes upward just touching the heel curve. With these two lines and a knowledge of certain simple rules of geometry the pattern maker is enabled to determine his heel height and the angle at which the leg portion must be set to the foot portion.

When the pitch has thus been decided upon, the top is drawn in with pencil; giving close at-

tention to the ankle and other measurements essential to good proportion.

The various parts are then outlined, — the vamp, the quarter, the toe-tip, and so on. As each part is drawn, an allowance is made for the extra space required for seams. Such a drawing is what is known in the trade as the *standard,*

and when complete it shows the entire plan of the shoe.

The standard now passes on to the parts-cutter, who reproduces in manila paper each separate part. From the standard all the parts are then cut. The sketch shown above illustrates the paper-board pattern for a circular vamp of a blucher shoe.

We have now the complete pattern for a pair of shoes. Because of the great amount of usage and handling that a shoe pattern gets, the light weight paper is, of course, too frail for practical

purposes. It is necessary, therefore, to have it reproduced in a much more substantial material, usually a compound paper or fibre board.

THE TRIAL SHOE

Before the boards are cut, however, it is important to make sure that the pattern is correct. To accomplish this, the paper pattern is sent to a shoe factory, where the parts are cut in leather, and made into a pair of trial shoes. This gives the pattern maker an opportunity to determine whether or not he has allowed enough on the pattern for sufficient lasting, for seams, turning under at the sole, etc.

If the pattern happens to be an entirely new style, and one about which there is any doubt as to popularity, the manufacturer does not order a complete set of patterns at once. Sample shoes are made first and the salesmen show them to the dealers. If sufficient orders are placed for the new model, then the pattern maker is instructed to make up a complete set of patterns in the regular way.

It will be remembered that the original paper pattern was made in size 4B, if a woman's, or size 7B if for a man's shoe. With this one size as a model, it is necessary to produce the entire range of sizes. Not many years ago this grading was done by hand, but now a grading machine cuts the patterns in all desired sizes.

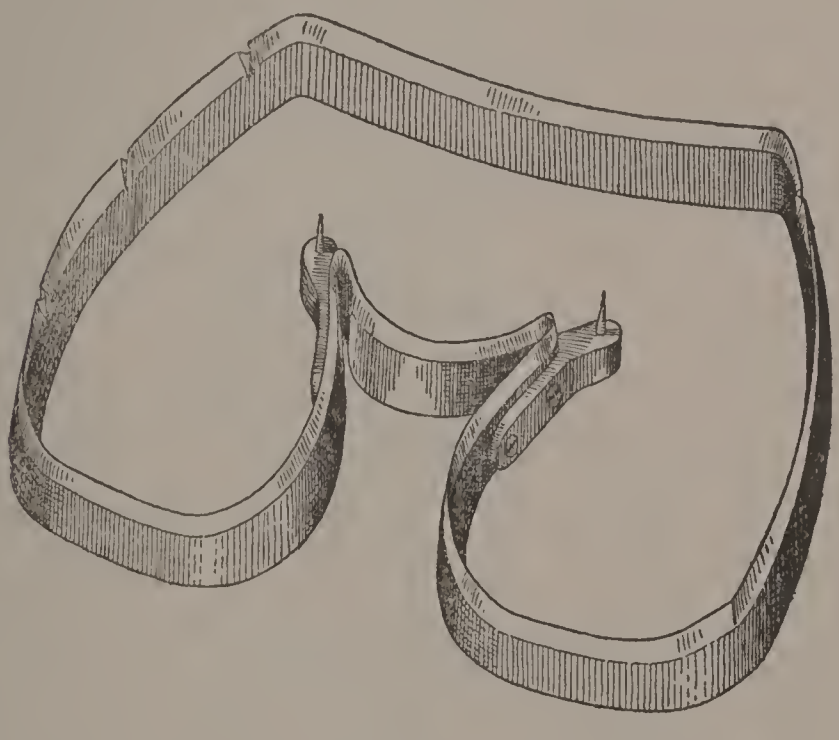
THE PATTERN-GRADING MACHINE

This machine also works on the principle of the pantograph, as already described in the previous chapter in connection with the last-turning lathe. However, the mechanical construction and appearance of the pattern-grading machine is quite different. It is built on a horizontal plane. On the right hand side is the model *follower* or tracing point; on the left, or *duplicator* side, is a sharp cutting drill which does the actual pattern cutting.

To supply a model for the grading machine, all the parts must once again be reproduced, this time it is made in sheet iron or some other suitable metal. This metal pattern is clamped to the "model" side of the grading machine. On the "duplicator" side, under the cutting drill, is placed a heavy paper board, from which the final pattern is to be cut. The radial arms, or levers, are adjusted by moving to the right or left, to get larger or smaller sizes. When all the necessary parts have been cut in all the required sizes, they are "trued-up" by hand. A highly skilled worker is required for this purpose, as the sizes must be truly graduated to the smallest fraction of an inch.

Every piece is stamped with size, width, style and last numbers. Recently a system of using various colors has been developed to indicate different widths and sizes. This is on the same

principle as the coloring of lasts, as mentioned in the previous chapter. The method has proved very helpful in preventing mistakes. A metal strip is now attached around the edges of each separate pattern. This operation is done on a binding machine which folds the metal tightly over the edges to protect it from wear. The pattern is now ready for the shoe factory.



If the shoe parts are to be cut by hand, the patterns can be used just as they are. But cutting is done by machine in many large factories, and this requires that *dies* be made from the patterns. A *die* is a knife-edged metal cutter made in the shape of the shoe part to be cut.

From the standpoint of time and labor saving there is considerable advantage in using the die.

In the first place it is apparent that the matter of cutting out a piece of leather with a sharp-edged tool, such as that shown in the illustration, is a simple operation of applying pressure to the die. In this tool there have also been combined three other features which otherwise would require additional operations. Notice the two sharp prongs extending from a brace at the center of the die. As a piece of leather is being cut by the sharp outside edge of the die these prongs press down and make two tiny holes on the surface. These mark the points where other parts of the upper will later be sewn. In cases where the parts are cut by hand this marking would require a separate operation.

The notches on both sides at the upper part of the die are to indicate the position to the toe tip. Later these will serve as a guide to the workman when the piece cut from this die is brought together with others to be made up into the shoe. Other notches are also used to designate shoe sizes and styles. Without the die these markings also would have to be made separately.

Although there is a great deal more to the technical side of pattern making than has been reviewed in this chapter, the reader will have acquired a good perspective of the work. It is also hoped that he will have developed an appreciation of the talent of the designer and pattern maker. Creative ability, tempered by

technical knowledge, is the secret of success in shoe designing. The men who possess that ability and express it in new and artistic styles, will always be in the vanguard of the shoe industry.

CHAPTER VI

TYPES OF SHOES AND THEIR PARTS

THE BAL

The term *bal* is an abbreviation of the name Balmoral, a city in Scotland. The ancient Castle of Balmoral is part of the estate of one of the oldest British families. The shoe that bears this name is said to have been designed by the shoemaker who served the family at Balmoral Castle.

The bal is a laced shoe and is distinguished by the manner in which the vamp is attached to the top at the instep. The vamp is stitched over the lower edge of the top part, in an unbroken curve, as shown in Figure A on page 107. This type of shoe is especially popular for dress wear and almost all very fine shoes are made from bal patterns. In addition, the bal is at present widely demanded for all other grades of shoes except those of the very heavy type.

BLUCHER

The *blucher* shoe received its name from a General Blucher of the Prussian Army who designed the shoe for military use in the Napoleonic Wars. It is interesting to know that the

three great generals who fought at Waterloo each originated a style of boot. The Wellington we have already considered. Napoleon also developed a type but this was not so practical as the boot designed by the Prussian general.

The blucher was at first used only in making men's footwear but later it was adapted also for women's walking and sport shoes. The blucher type is a laced shoe, but differs from the bal in the manner of attaching the vamp and top at the instep. The top part is stitched over the edge of the vamp at the sides but is allowed to swing free at the center on either side of the tongue. This free portion is finished separately and is often cut in a square design with perforated edges. See Figure B of the group on page 107.

OXFORD

The oxford received its name from Oxford University where it was supposed to have been first worn about three hundred years ago.

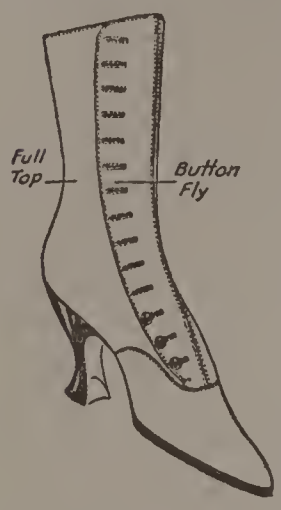
It is difficult to say what the original design may have been; the name has come to mean any ankle shoe that fastens over the instep, as in Figure D of the group. The "plugged oxford" is one cut with a whole vamp, with a separate piece inserted in front to form the lace stay. The oxford may be made from bal, blucher or button patterns.

In England the oxford is the only type of

footwear classed as a *shoe*. Anything higher than an oxford is called a boot.

BUTTON SHOE

The term "button shoe" indicates clearly its type, and every retail salesman is familiar with it. In making the button shoe, an extra part known as the *fly* is used. This is the small strip in which the button holes are made. It is joined to the top by a seam down the center of the front part of the shoe. The button fly is usually allowed to swing free at the vamp line — blucher fashion.



PUMP

The pump is very popular in America for summer wear but, strictly speaking, it is not considered to be a scientific type of footwear. Although the wearer may not be conscious of any effort, the pump is usually held in place by drawing the toes inward toward the ball of the foot. This almost unconscious habit of "clinging" to the shoe produces a nervous and muscular strain. In time it would have a harmful effect on the health of the person who steadily continued to wear pumps. There probably is no harm in using the pump occasionally for dancing and the like, but it should not be recommended for general usage.

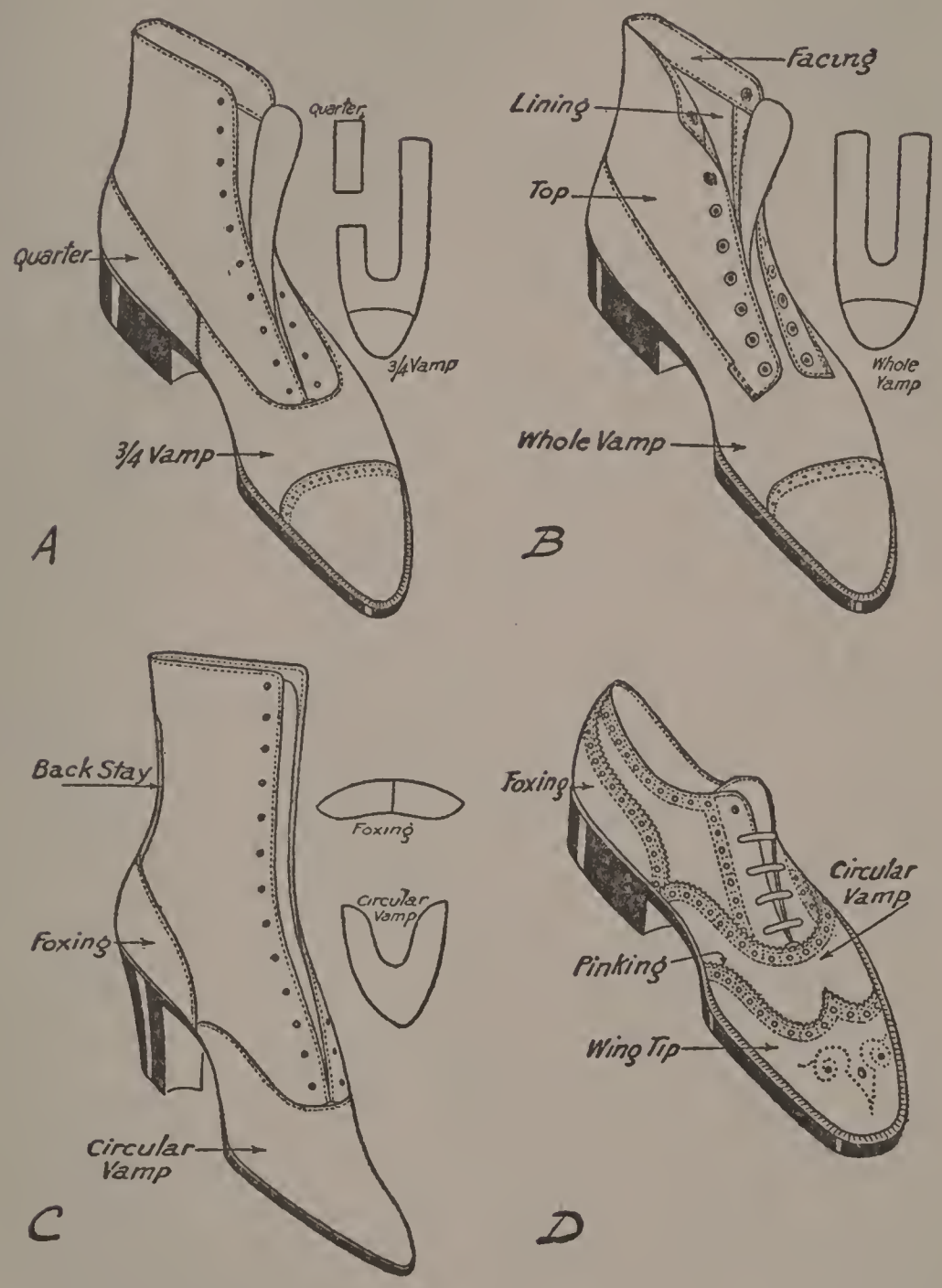


FIGURE A. Illustrates the Bal type with three-quarter vamp.
FIGURE B. Illustrates the Blucher with whole vamp.
FIGURE C. Illustrates the Polish type with circular Vamp and Foxing.
FIGURE D. Illustrates the Brogue Oxford; pointing out the Wing Tip and Pinking.

BROGUE

The *brogue* is of very romantic origin. It has changed a great deal from the form in which it was first worn many years ago in Ireland. The original brogues were made of raw cow hide with the hair left on and turned in to give warmth to the foot. At present the name is applied to any heavy shoe, especially to those ornamented elaborately with wing tips, foxings and many rows of perforations, as illustrated in Figure D of the group.

THE POLISH (derived from Poland)

The name *Polish* is applied to women's and misses' front-laced shoes of more than ankle height. The type has been especially popular in this country for the past few years. It is most suitable for fine shoes to be used for afternoon wear. The pattern is said to have originated in Poland a good many years ago. It can be distinguished from the bal by the height of the top. See Figure C. Extremely high heels are generally required for Polish patterns.

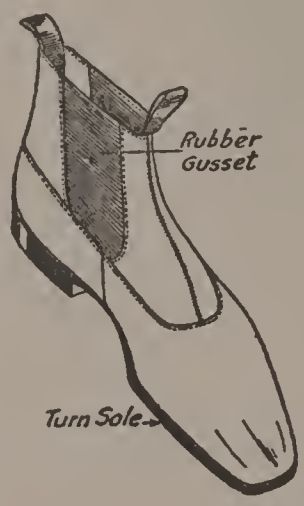
TIES

The *tie* differs from the oxford in that it has fewer eyelets and is usually fastened with ribbon instead of laces. The type, as a rule, is classified according to the number of eyelets as: One-eyelet tie or two-eyelet tie. A low

shoe with more than three eyelets is placed in the oxford class.

CONGRESS GAITER

The *congress gaiter* was very widely worn during the latter part of the past century and is still often worn by men of the older generation. It is ankle-high with leather or cloth top, adjusted at the ankle with strips of rubber cloth in the sides. This insertion of elastic renders buttons or laces unnecessary. Such a shoe is the "last word" in comfort but can hardly be so considered from the standpoint of style and appearance.



SPECIALTY SHOES AND BOOTS

Bootees are boots with short legs. Sometimes they are made with strips of rubber cloth or elastic over the ankles. They are also made with laces inserted in the front, extending from the throat of the vamp over the instep to the ankle, and have the leg part closed like a boot. The same name is also applied to little knitted boots for infants.

Carriage boots are more or less elaborate overshoes for women and are worn, during cold weather, over opera slippers with formal evening dress. They are usually made of warm cloth fabric and are often fur-lined. The carriage

boot, as its name indicates, is not for walking purposes; the material of which it is made being much too delicate for practical wear. The chief purpose of this boot is to give warmth to the wearer while riding to and from social functions.

The *court tie* is a low straight-top oxford for men. It is usually made of patent leather and fastens with a silk tie. This type of shoe is required for Court ceremonies in England and other countries where courts exist. It is often worn in our country as a dancing shoe by men who find pumps uncomfortable.

Cowboy boots are a type of high leg boot, having sometimes an ornamental top. The heel is especially high, resembling a woman's cuban heel. These boots were originally designed for, and to some extent are still worn by western cowboys. While the high heel might serve to prevent the foot from slipping forward in the stirrup while riding horseback its use is chiefly a matter of style more than anything else. The cowboy finds no inconvenience with with the high heel, for the reason that he does very little walking.

The *gaiter* was originally a boot with elastic at the side, such as the congress gaiter already described. The name has been applied recently to boots made in imitation of the gaiter, that is, with elastic inserts. In some parts of the country the name gaiter is used in referring to spats.

Larrigans are knee-high leg moccasins or boots

made with moccasin soles and sometimes have wedge-shaped heels. They are worn by lumbermen in our northern forests during the winter. The larrigan is a Canadian creation and derived its name from the designer who was himself a lumberman.

The *mule* is a house slipper for women. It has a high heel but no counter nor quarter. The type is of very early origin and is now usually made of satin or fine kid.

Orthopedic shoes are usually made to order for persons having some form of foot deformity that cannot be corrected with the use of ready-made shoes or the ordinary appliances. The word "orthopedic," however, is often used by manufacturers who make foot-form or common-sense shoes that are designed to conform to the natural shape of the foot.

River driving shoes are used by lumbermen in regions where rafting is necessary to get the logs down a river. All lumbermen's boots are spiked, and river-driving spikes are extra long and sharp.

Side-laced boots are laced up over the ankle on either the inner or outer side instead of the front of the shoe. This style has often been used in women's novelty boots and shoes. One form of side-laced boot that has proved of practical usefulness is a specialty shoe for extra stout women. This is made to be laced on the inner side so that the shoe can be adjusted readily by placing the

foot on a convenient stool or by crossing the knees.

This model is used in soft kid by professional women dancers.

Wading boots are rubber hip boots used generally by fishermen or persons whose activities require walking in marshy places or across shallow streams.

PARTS OF A SHOE

BACK STAY

The *back stay* is usually made of leather and is stitched to the outside of the shoe at the back seam. It serves the double purpose of supporting the top and reinforcing the seam. Sometimes the stay is made of heavy canvas and is inserted between the leather and the lining. There are many modifications of the stay; some extending from the heel to the top of the shoe and others extending only part way up.

BELLOWS TONGUE

As the name suggests, the *bellows tongue* is similar in construction to the ordinary bellows. It is made with pleats so that it may open wide and allow plenty of space for the foot to slip into the shoe. Unlike other types, the bellows tongue is stitched all the way up on each side of the top. It is used extensively in hunting boots and in heavy work shoes because of the extra

protection against moisture afforded by having the tongue sewn all the way up on both sides of the shoe. The bellows tongue is used only with the blucher type of boots or shoes.

COLLARS AND CUFFS

Collars and *cuffs* are strips of leather that are sometimes stitched around the outside of the top of the shoe. They are used especially on children's shoes for ornamental effect. The cuff answers the same general purpose but is wider than the collar.

FOXING

Foxing is the name given to the piece of leather that sometimes takes the place of the quarter when a circular vamp is used. This name is also applied to an extra strip of leather to cover the lower part of the "top" or counter part in heavy brogues or sport shoes, as indicated in the illustration on page 107.

LIFT

Lift is the name applied to the separate pieces of sole leather or stock used in making heels. The "top lift" is the piece that forms the wearing surface of the heel.

LINING AND FACING

The reader has already learned from the volume on "Materials in Shoes" about the qualities

of materials used for lining shoes. The vamp lining is cut in one piece so as to avoid seams except, of course, where it is joined in the back. The top lining does not extend to the edges of the top part because the facings serve to finish off the inside edges.

The *facing* is used for the three-fold purpose of finishing the inside, reinforcing the edges, and covering the eyelet stays. The eyelet stays are little strips that are inserted for reinforcement under the leather where the eyelets are made.

PIPING

Piping is a thin, narrow fold of leather or other material inserted between two parts at the seams, or at the edge of an upper. It is sometimes used for decorative purposes but usually acts as a reinforcement.

QUARTER

When a three-quarter vamp is used, it is required that the remaining quarter of the way around the shoe be filled with another piece of leather. This part is known as the *quarter*. Figure A of the group on page 107 shows the position of the quarter. It joins the vamp at the side seam and also at the back seam. When a *half* vamp is used, two quarters are required to connect with the vamp on each side. They con-

tinue to the back seam where the two quarters are stitched together. Oxfords are generally made with a half vamp and two quarters.

RAND

The *rand* is a piece of leather formed in the shape of a horse shoe. It fits around the heel seat, that is, the place where the heel is to be attached. This serves the purpose of edge-filling and prevents any chance of gapping between the heel and the upper.

SHANK

The *shank* is a strip of metal used to stiffen the sole of a shoe between the heel and the ball where there is no other support provided. The word "shank" is also used to designate the part of the sole where the shank is inserted.

TIP

There was a time not many years ago when *tips* were made in a great variety of shapes for decorative purposes but nowadays there are only two styles commonly used.

These are the ordinary *straight* tip used on nearly all styles of practical shoes, and the wing tip such as that illustrated in Figure D of the group. The wing tip is used on brogues and sport shoes, not only for decorative effect but be-

cause of the extra reinforcement it gives to the shoe at the point where the foot spreads.

TOP

The *top* is the part that forms the leg portion of the shoe. There is no top to an oxford or a pump. In some styles of shoes, according to the will of the designer, the top extends all the way to the heel, as will be noticed in the small illustration of the button shoe on page 106. The top is sometimes called the *quarter,* although, rightly, this name belongs to another part of the shoe, as has been shown previously.

UPPER

The term *upper,* as used in the trade, refers to all the upper part of the shoe and includes the top, vamp, quarter and lining — in fact, everything above the sole. When we speak of the upper, therefore, it will be with reference to all that part of the shoe above the sole.

VAMP

There are three kinds of vamps. The *whole* or *continuous* vamp extends around the shoe in one piece and meets at the back seam. The *three-quarter vamp,* as its name implies, goes three-fourths of the way around the shoe, from the back seam around the outside to the middle of the arch on the inside. The *half* vamp ex-

tends from the middle of the arch on one side to the middle of the arch on the other side. A *circular* vamp is a half-vamp with the upper edge curved down toward the sole seam instead of being joined to the quarter with a straight seam at the side. The different vamps are well illustrated in the group figure.

TECHNICAL TERMS

A *channel* is a slanting cut made around the edge of a sole. While the shoe is being made the edge of the channel is turned back and the stitches buried in the channel. The edge of the channel which is called the *lip*, is then turned down over the stitches to protect them from wear. After shoes have been worn for a time, the stitching sometimes begins to show around the sole. This means that the lip of the channel has worn away. In a welt shoe the lip is turned back so that it may serve as a "shoulder" against which the welt is sewn.

Clicking is an old English expression for cutting. In the earlier days of shoemaking it was the custom to cut the upper with long shears. As the workmen, in doing this, came to the edge of a piece of leather the two cutting edges of the shears would snap together with a pronounced "click." With several men doing this kind of work in the same room the sound of the

clicking became quite noticeable, and it was because of this that the cutting operation came to be known as "clicking."

Fudge stitch edge is a term used to designate a method of sewing and finishing the upper surface of the welt. Instead of having the stitches come all the way through the welt so as to be seen from an upper view of the shoe, it was the fad at one time to cut a channel in the welt and then to fold this back in position after the stitching has been completed. This left a perfectly plain surface to the welt which was later embossed in a pattern of small ridges to represent stitches. It was a passing style, however, and the trade soon tired of it.

Perforations are rows of small holes punched in the leather, usually along the line of the seams of the tip and vamp. These are generally used for ornamental purposes although on rare occasions perforations are also used for ventilation.

Pinking is a fine "saw-tooth" edge used for decorative purposes on such types of shoes as brogues and sport shoes. This term originally came to be used because of the close resemblance in appearance to the petal edges of the flower known as the pink or carnation. An illustration of pinking as used in footwear is shown in Figure D on page 107.

Skiving means the shaving off of the edge of a piece of leather to make it thin enough to turn under without any bulkiness at the seams.

Wheeling is a process employed to make a series of corrugations or impressions on the upper surface of the welt, instead of stitch separation. It is produced by the use of a corrugated wheel. The finish is sometimes used to imitate the stitching of a welt shoe. It is a purely ornamental feature.

CHAPTER VII

ORGANIZATION OF A SHOE FACTORY

THE MODERN FACTORY

The traveler who ventures into a strange land without map or guide is likely to meet with some confusion in finding his way through the country. No less bewildering would be the experience of a person who entered a modern shoe factory without first learning something of the organization and the lay-out of the many departments that contribute to the making of a shoe. Before going into the factory, then, it is well for the visitor to get his bearings in order that he may be able to identify the various operations when he later comes to them.

Almost everyone is familiar with the long, narrow factory structure with its rows and rows of windows. Such buildings we often see from the train window while riding through the outskirts of the large cities. Sanitation and efficiency demand of the ideal shoe factory that it shall have the maximum of window space. It is for this reason that the long narrow model of building has been generally accepted. The average shoe factory is from two hundred to four hundred feet long, fifty feet wide and four stories high.

The length often varies, but the width of a factory seldom exceeds fifty feet. The purpose of the narrow building is to permit the daylight to enter from the windows on each side and penetrate to the center of the building; thus avoiding the need to use artificial lighting. In some states there are laws in force that require the use of natural lighting, as a protection for the factory workers.

As the output of a factory increases it often becomes necessary to build additions to the original plant. This is done by adding "wings," usually the same size as the old building. These branch out at right angles, forming Ls. Some times the extensions continue until the factory is a vast assembly of rectangular buildings, all skillfully arranged with sufficient space between to admit plenty of light to both sides of each structure. Some large shoe factories employ as many as five thousand workers and are equipped to turn out from 10,000 to 30,000 pairs of shoes and more daily.

What is said in this chapter concerning factory organization is based upon conditions as they are found in the larger manufacturing plants. This is done in order that the reader may get a broad understanding of all the refinements of modern shoemaking. As in every other type of business there are organizations ranging in size from the very small to the very large which stand out as models of efficiency and expert management.

Likewise there are differences from the standpoint of ownership. Some shoe factories are owned entirely by one person who is the directing head of all its activities. There are a considerable number of partnerships where the ownership and management is divided among two, three or more people. The larger shoe factories are corporations with their carefully worked out plans of management, ownership, division of responsibility, and such other important features. In spite of these things, however, the actual processes of shoemaking remain about the same regardless of the size or form of organization. Methods of dividing the work and the responsibility may differ but the work itself varies but slightly.

RECENT IMPROVEMENTS

Within recent years there has been a genuine effort put forth to make the factory exterior as attractive as possible, and it is not uncommon to find the original brick walls overgrown with climbing ivy or Virginia creeper. The courts and areas between buildings are often laid out into gardens or planted with evergreens so that when the factory operative glances up from his work the eye is refreshed for the moment with a glimpse of green, instead of the somewhat depressing sight of bare walls and empty lots.

In some instances, vacant property adjoining the factory site has been acquired and converted

into parks for the use of the employees. In this respect one of the largest manufacturers near Boston, has a factory that approaches the ideal. Not only is a considerable space devoted to the delightful private park, ball grounds and the like, but a large portion of the great stretch of roof has been converted into a promenade or roof-garden where the employees may spend the noon-hour. Provision has also been made for indoor recreation in the form of billiards, bowling and dancing.

Such extensions as these are becoming more and more a feature of the modern factory. Investigation has shown that the worker who is permitted to get some form of invigorating exercise during the noon hour and complete relaxation under pleasant surroundings, does better work and feels better when he returns to his machine at one o'clock.

BUSINESS ORGANIZATION

There are three main divisions to the commercial side of shoemaking. They are the executive offices, the business offices and the factory offices. The men who hold the executive positions are responsible for the progress of the business and, accordingly, they are the men who develop business policies and direct the major activities of the company. As a rule the executives in the shoe industry are men who "grew up" in the business and maintain an active

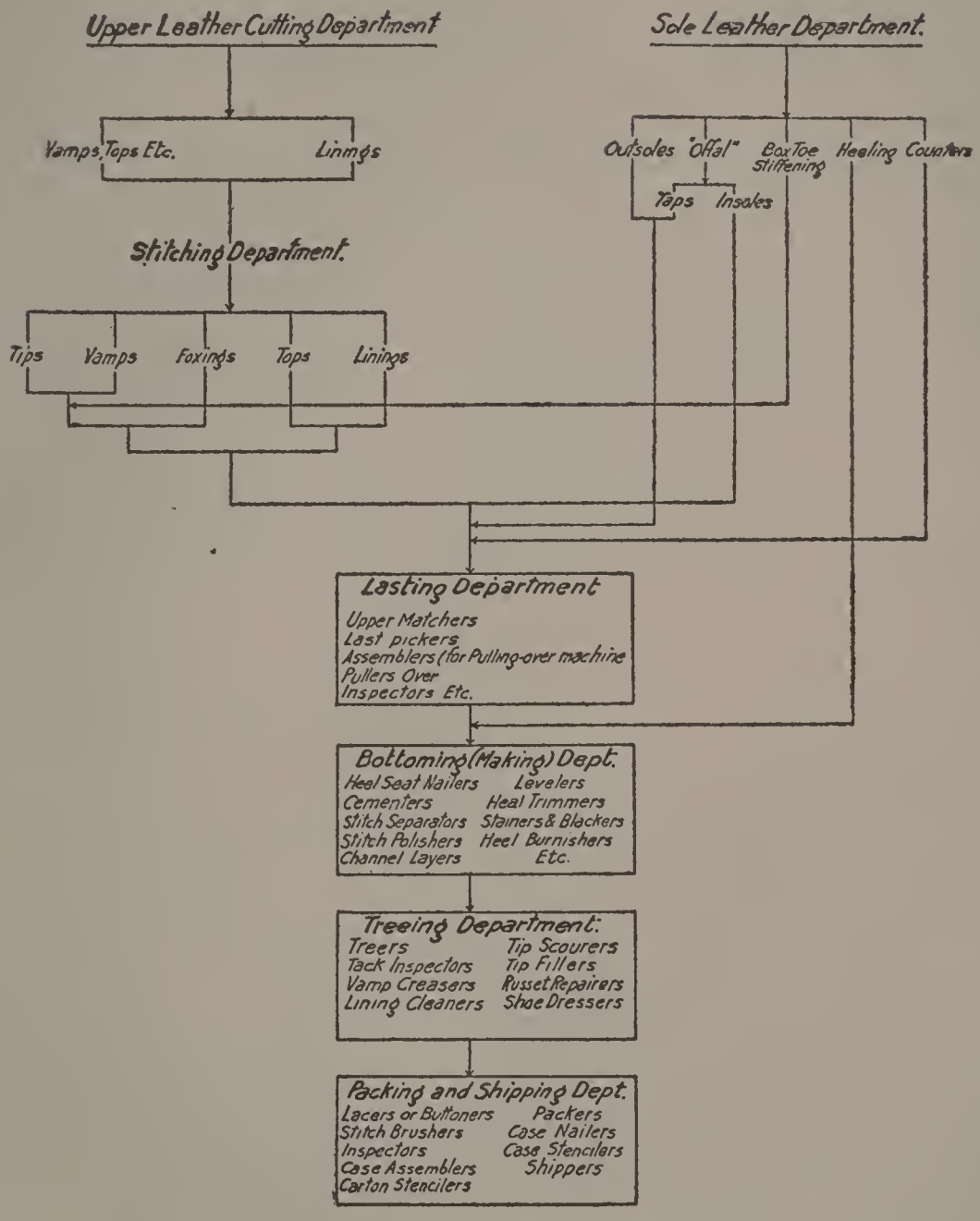
interest in the work. For that reason, we often find the supervision of the entire business divided among them. For instance, the president might supervise the plans for advertising and publicity; the vice-president might direct the selling activities and all things related to new business, while the treasurer, in addition to his responsibility as financial director, sometimes supervises the cost accounting and credits and collections. In a smaller-sized business these responsibilities would naturally be divided among the partners according to the special abilities of each one.

BUSINESS MANAGEMENT

The business management of the organization, as the name implies, takes care of all the outside business relations of the firm. The purchasing of all new materials to be used in the manufacture of shoes, advertising and selling, bookkeeping and correspondence — in fact, all work that is not directly concerned with the actual factory operations, is under the supervision of the business management division.

FACTORY MANAGEMENT

The factory is directed by the superintendent who is usually a member of the executive board and is an officer of very great responsibility. A separate office and clerical force is maintained in the factory to keep the records of manufacture and make out the schedules by which the work progresses through the factory



ORGANIZATION OF A MODERN SHOE FACTORY

from one operation to another. It is the duty of such an office to do all the planning of the work to be done by each machine. Records are kept to show the output of each operator and the machine he operates, so that at any time the superintendent can tell at a glance exactly how much work can be handled within a given period. A daily record shows just how much progress has been made on an order as it advances through the factory. If shoes have been damaged or are temporarily delayed, these facts will be brought to the immediate attention of the superintendent through the factory office records.

When a new order is received in the factory office, the *order clerk* gives it an order number. Three tags bearing this number are then prepared for each two dozen shoes to be made. The tags give the details of how the shoes of the particular order are to be made. The order tags are sent to the foreman of the three main manufacturing departments: the cutting room, the sole leather room and the bottoming room. As each foreman receives the tags he makes arrangements to lay out all the material required for that particular order — and the shoe starts on its way.

UPPER LEATHER CUTTING DEPARTMENT

The manufacture of shoes usually begins at the top of the building and progresses downward

so that the finished shoe all ready for shipment will arrive on the ground floor where the shipping department is located. For this reason we find the upper cutting room on the fourth or fifth floors.

One notable exception to this general rule is a large shoe factory in the middle West. In this particular case all the operations of manufacture, from start to finish, are done on one floor. The factory is a one-story building and the operations are planned so that an order starts at one end of the building, goes through all the processes, is completed, and the shoe is ready for shipment when it reaches the opposite end of the building.

STITCHING DEPARTMENT

After the parts of the uppers have been cut they are sent forward to the stitching room where all the various parts, including linings, facings, tongues, button flies, and so forth, are stitched together. There are special operators in the stitching room who are called "cripple" workers. It is their work to repair all mistakes in stitching that can be so treated, before the order is permitted to go forward to the next department.

SOLE LEATHER DEPARTMENT

The sole leather department is, in some factories, known as the stock-fitting division. At

the same time that the shoe uppers are cut in the upper leather room, the soles are cut in the sole leather department according to the specifications on the tag as received from the order clerk. The inner soles, the toe boxes and the heels are also prepared in this room and sent forward to be assembled in the next operation.

MAKING DEPARTMENT

The *lasting* and *bottoming* is done in what is known as the making department. The uppers, as sent from the stitching room, and the soles, supplied by the sole leather department, arrive in the making room at the same time. *Lasting* is the operation of fitting and tacking the upper over the last. *Bottoming* is the name given to the work of attaching the outer soles.

FINISHING DEPARTMENT

The touching-up and final dressing is given to the shoes when they arrive in the finishing room. Also, the important matter of final inspection is usually provided for in the finishing department.

TREEING, BOXING AND PACKING

The three operations of treeing, boxing and packing, which prepare the shoes for the shipping room, are, as a rule, taken care of in one depart-

ment. In some of the very large factories, however, a separate department is maintained for each.

EXTENT OF FACTORY ORGANIZATION

A glance at the organization chart shown on page 125 will give some idea of the very great number of things to be done to a shoe before it is finally ready for the hands of the retail salesman. The various main departments of shoe manufacture are all subdivided into many detailed sections, each requiring many operators.

When a person considers that a pair of shoes in the making, passes through hundreds of pairs of hands and often through several scores of machine operations, situated on various floors of buildings covering several acres of ground, it is possible to realize how extremely important is the organization and administration of these great modern shoe plants.

CHAPTER VIII

PREPARING THE UPPERS AND SOLES

INFORMATION TAGS

Now that the reader has a fairly clear idea of the factory lay-out, it may be assumed that he is ready to make a tour of the factory; pausing in each department long enough to observe the various operations. To begin with we are received in the factory office. Here, a new order has just been turned over to the order clerk. He gives it a number and this number is then stamped on three different kinds of tags, as previously mentioned in the chapter on "Factory Organization."

One kind of tag calls for information about upper leather, linings and stitchings. The instructions must be filled in to the last detail — even to the size of thread to be used in stitching. This first tag is for the Upper Leather Department.

The next tag requires information about sole leather. The clerk examines the new order carefully to learn what quality of shoe is desired. He must know whether the shoes are to be light or heavy weight, and also whether the Goodyear

welt, McKay, or some other method of making is required. All this, with much additional information, goes on the tag for the Sole Leather Room.

On the third tag are written all the details and necessary instructions that affect the assembling, that is, the joining together of the uppers and the soles. This is for the information of the foreman of the Making Room.

Several copies are made of these tags — one for every two dozen shoes on the order. The parts of the shoes move along in lots of two dozen and it is desirable to have a tag for each lot.

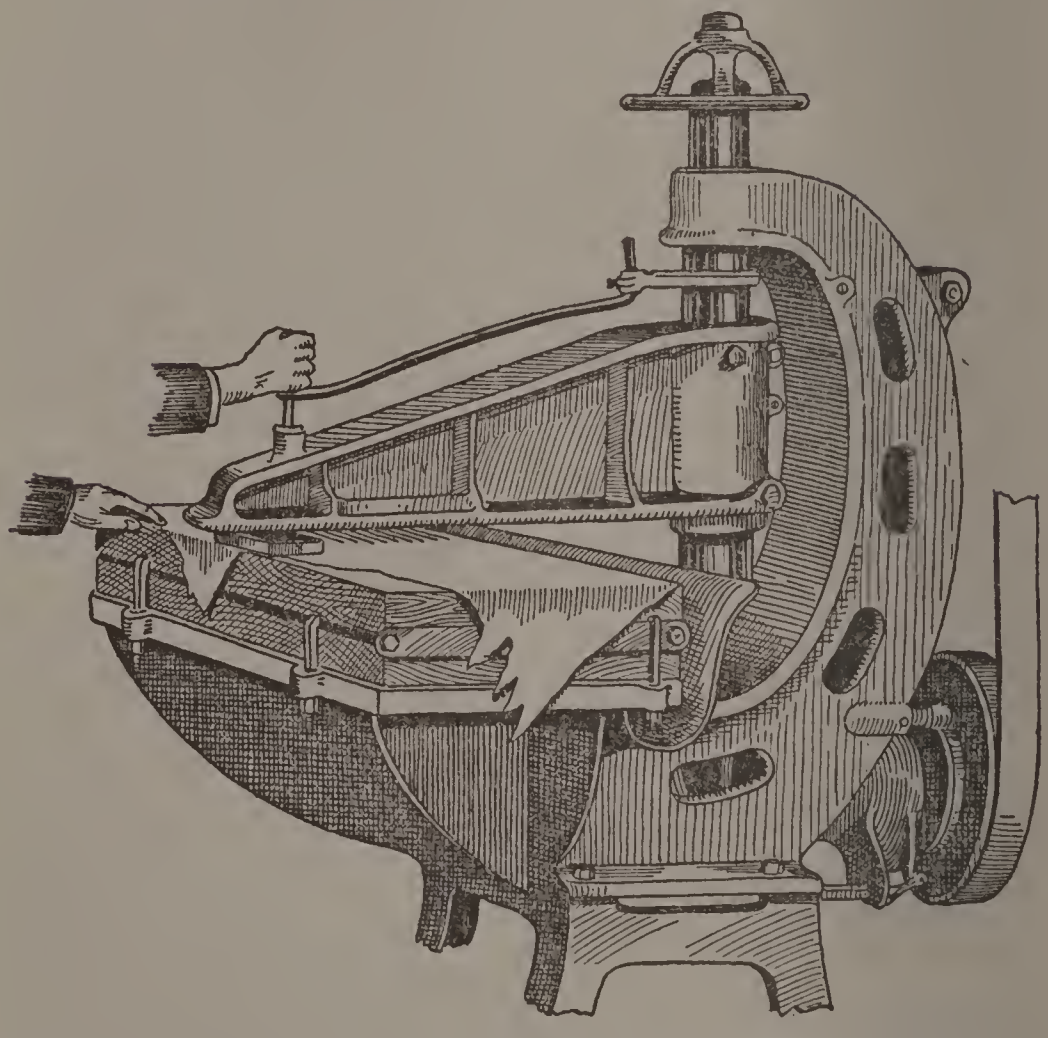
WORK OF THE UPPER LEATHER ROOM

We shall plan our tour of inspection to follow the order tags. Accordingly we first arrive in the Upper Leather Room.

With the tag as a guide, the foreman figures out the amount of leather and lining fabric that will be required. The leather is then distributed to the operators of the *clicking* machines. The clicking machine, as can be seen in the illustration, has a cutting board or table very much the same as those used by the old-fashioned hand cutters. Suspended above this board is a beam or "arm" which swings from right to left and can be located over any part of the board. The skin to be cut is placed on the board and the operator selects one of the *dies*. It will be re-

membered that these dies are made in the exact shape of the patterns and are used to cut out the various parts of the shoe.

The operator moves the die over the surface of the leather until he decides exactly where that



part can be cut to best advantage. The dies are $\frac{5}{8}$ of an inch in height and are so light that no impression is made on the leather until pressure is applied. The beam of the clicking machine is first brought in position over the die. Then a downward pressure of the handle by the operator causes the beam to deliver a quick

blow on the die, thus forcing it through the leather. There are dies, of course, in every size and width, and all these parts are cut in the Upper Leather Room — even the linings and facings.

Sometimes the various parts of the upper are cut by hand instead of by machine. In such cases the workman may cut out the parts by pounding the die with a mallet until the sharp edge has cut through the leather or fabric. Still another method is that of cutting the part with a sharp knife. The flat paper-board pattern in the shape of the part to be cut is laid upon the surface of the material and the workman then traces the outline with his knife. Naturally, this hand-work method requires a great deal more time than does the machine method and is used only in those cases where the amount of work to be done is small.

SKIVING

After the different leather parts required for the order have been cut, some of the edges that will later have to be turned under or lapped over at the seams, must be *skived* or thinned down to a bevel edge. This work is done by a *skiving* machine. The edge of the material to be skived is fed to a revolving disk which cuts it down to the desired bevel. The skived edges are then given a slight coating of cement and folded down. This is done on a machine that

turns back the edge very much as the hem on a piece of cloth is turned under. The machine pounds down the fold at the same time so that is presents a smooth edge.

PERFORATING

The perforations in toe tips, vamps and wing tips are sometimes made by *punching* machines. The tips are usually perforated by a little machine that punches the whole perforation design at one stroke by means of a die.

The ornamental perforations for wing tips and other edges are quite commonly cut on a *perforating* machine that operates on the same principle as the sewing machine. However, for this kind of perforation work a small hollow tube with extremely sharp edge is used instead of the needle.

If the order calls for a special design in perforations, a sketch of it is illustrated, to serve as a guide to the operator.

CUTTING THE LININGS

The linings and other fabric parts are sometimes cut by hand from the metal-edged patterns with which we are already familiar from the description given in the chapter on "Patterns and Style Creations." However, in cases where any considerable amount of cutting is to be done the operation is performed by machine. Several

TOP FIGURE — Lining with Back Stay attached.
SECOND — Lining with Back Stay, Eyelet Stays and Facings attached.
THIRD — Top showing back seam closed with Back Stay.
FOURTH — Top sewn to Lining.

layers of the fabric, perhaps a dozen, may be laid out, one over the other, to be cut by dies. For this use a powerful stamping machine is required, and the pressure must be sufficient to force the die through the entire thickness of fabric with one blow. The die for this purpose is made on the same principle as that used for cutting the upper leather although it must be considerably higher so as to cut through many thicknesses of fabric.

On one of the top linings of each shoe is stamped the order number and the size of the shoe for which the lining is intended. When all the parts, both leather and fabric, have been prepared according to the instructions on the tag, they are stacked by size and width and then sent forward with the tags, to the Stitching Room.

STITCHING DEPARTMENT

In the Stitching Department all the parts of the upper are brought together to be stitched into one complete upper. Most of the operators are women and the work is divided and subdivided so that each person becomes expert at one special feature of the stitching.

The machines are arranged in such a way that the work can be passed along from bench to bench without any unnecessary handling. For instance, the lining stitchers are arranged in one group and the top stitchers in a corresponding group. The linings are given to the first operator

of the lining group who closes the heel seams; the second operator stitches on the inside stays at the heel seam; the third, attaches the top facing; then the fourth and fifth operators put on the side stays or flies.

While this work is being done on the lining, the leather top parts are given to the first stitcher in another group to have the back seam closed; the second worker adds the back stay; the third attaches the eyelet row, and a fourth completes the work, and if the pattern requires, stitches on the foxings.

If the work has been properly timed, the tops and linings arrive at the center table at the same time. The person in charge then distributes the tops and linings to another row of operators who join them together. Following along to the next step, the tops are turned right side out and the top stitching is run around the edge. These operations may be seen by an examination of the illustrations.

Eyelets or buttonholes are added at this point. The eyelets are made by the *duplex eyeleting* machine which attaches and firmly fastens the eyelets to both sides of the shoe at one time. By having both rows of eyelets set in at the same time and by the same machine the danger is reduced of having the shoe finished up with eyelets that are not opposite each other.

After these operations have been completed the tops are ready for the attaching of the

UPPER LEFT HAND FIGURE — Illustrates the Whole Vamp (Leather).

UPPER RIGHT — Reverse View of Vamp showing the Lining and Reinforcement.

CENTER — Vamp with Heel Seam closed and Tip attached.

LOWER — Upper with Vamp attached ready for the "Making" Room.

vamps. Of course, the vamps have, in the meanwhile, been made ready by special operators who have closed the side and heel seams and attached the tips. Finally the vamp is stitched to the top. This operation requires great skill and accuracy because the success of the later operations of making the shoe depends largely upon the work of the vamper.

If double rows of stitching are required, the sewing is done on a special machine equipped with two needles instead of one. Many minor operations such as making straps and tongues are also performed in the Stitching Room. After the vamper has completed the work of attaching top and vamp, the tongues are sewn in, or buttons are attached as the case may require. The linings are then finished off at the toe and heel.

If the patterns are bal, blucher or Polish, the next and last operation in the Stitching Room is the lacing of the upper with a temporary lacing to hold all the parts in correct position while the shoe is being made. This work is done on a *lacing* machine which passes strong twine through the eyelets; lacing the uppers through five pairs of eyelets and tying the ends of the twine, with a single movement of the machine.

With this operation, the work of the Stitching Room is completed. The different lots of finished uppers are then sent with their tags to the Making Room.

SOLE LEATHER DEPARTMENT

As soon as the uppers are well under way the foreman of the Sole Leather Department receives his tags and selects the necessary stock for the soles, inner-soles, box toes, counters, welting and heel lifts.

The outer soles are first roughly cut from sides of leather either with dies or on a sole cutting machine as described and illustrated in the volume on "Materials in Shoes." However, to make the soles conform exactly to the desired shape they are usually finished off on a *rounding* machine. The rough-cut sole is held between clamps, one of which is the exact pattern of the desired sole. When the machine is started, a small knife quickly traces the pattern and cuts the sole in exactly the same shape. The soles are then fed through a *rolling* machine and are there subjected to very high pressure between heavy rolls. This serves to tighten or draw together the fibres of the leather and thus add to its wearing qualities. With the use of a *splitting* machine through which the soles are now passed they are reduced to a uniform thickness. The machine shaves off any portions of the sole that may be slightly over the required thickness.

The various operations in the preparation of the inner sole are practically the same as those described above in connection with the outer sole. In the trade the terms "outsole" and

"outer sole" are used interchangeably in referring to the same part of the shoe. Likewise "insole" is used as an abbreviation for "inner sole." In this volume and others of the Course the full terms are often used for the purpose of greater clearness.

CHANNELING — WELTS

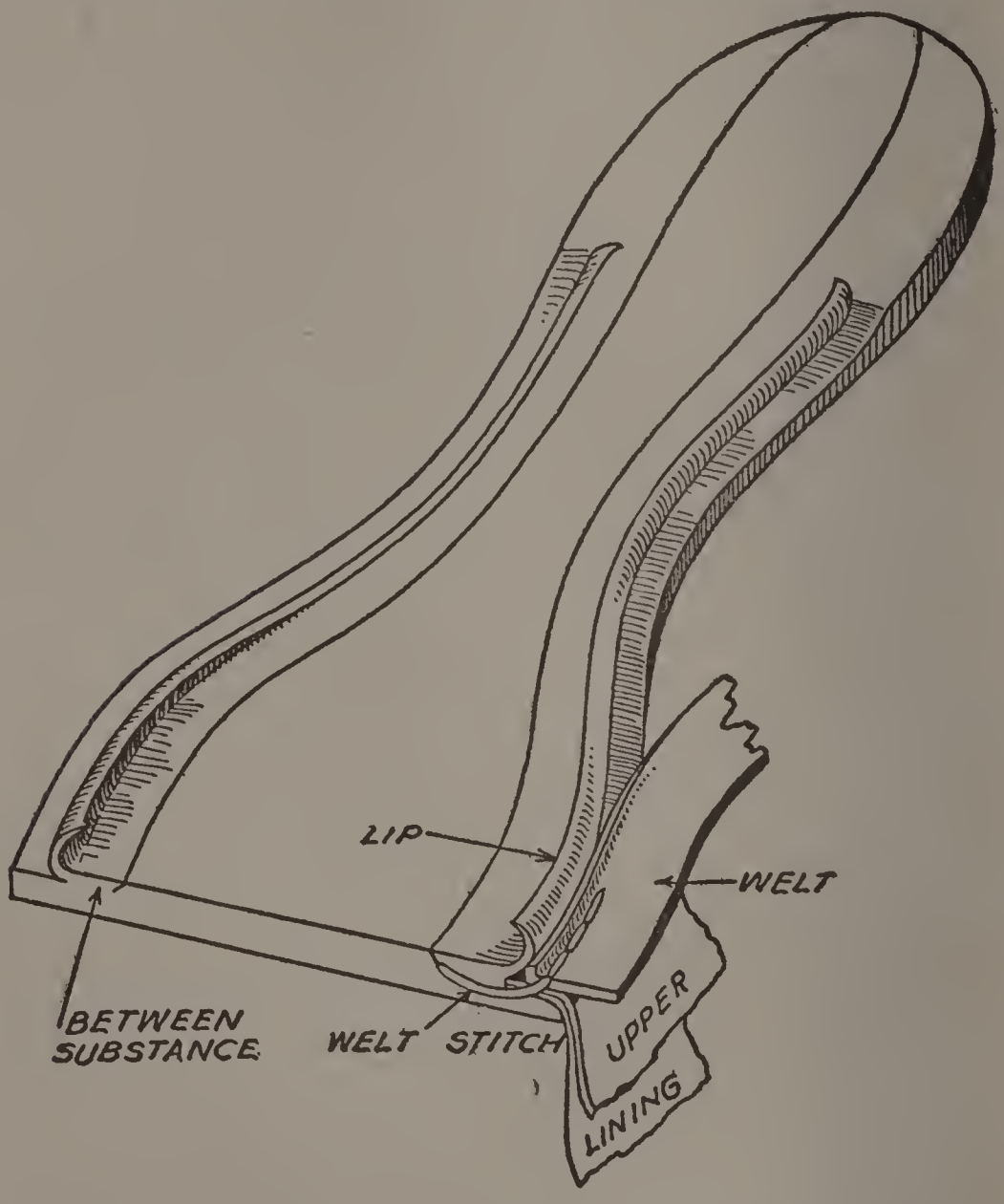
After being cut out and finished, the inner sole is next passed along to the *channeling* machine. In this operation two shallow channels are cut around the edge of the inner sole. This cutting is done on the flesh side, which, in the finished shoe, will be the side next to the outer sole.

The channels are cut so that they slant toward each other as shown in the illustration following. In a later operation the channels will serve a very useful purpose. They are to receive the stitches of the *welt* machine at the time the welting is to be attached. This subject will be considered in detail when we come to the Making Department.

LIP-TURNING — WELTS

A *lip-turning* machine, as its name suggests, performs the task of turning up the lips of the channels that have been cut in the preceding operation. This is done in order that the lip may be made to stand out at right angles, thus forming a shoulder to which the upper and the welt are sewn. The cut made on the surface

inside the lip will later serve an important purpose as a guide to the workman when the shoe is ready for sewing on the welt machine.



When the lips are turned, the space between the channel is about one-eighth of an inch. This space is called the "rib" or "between substance" and it is through the rib that the curved needle later will pass — leaving the stitches buried in the channel.

BOX TOES AND COUNTERS

If the box toes and counters have not previously been purchased ready-made from a specialty manufacturer, they are now prepared in the sole leather room. Both counters and box toes are cut with dies in all the required sizes. The edges are then skived to a knife-like thinness to prevent them from sticking out and forming unsightly lines that otherwise would show through the leather in the finished shoe.

HEELS

The heels to be used on the shoes are formed of different lifts of leather or other material. They are cemented and nailed together in a *heel-building* machine. The layers are the subjected to tons of machine pressure for the purpose of molding them into exact shape. The compression also serves to make the heel more solid; thus greatly increasing its wearing qualities. The top lifts are prepared separately from the main portion of the heel. However, they are made ready here, in the Sole Leather Department, and are later sent on to be attached to the shoe in the Making Room.

When all the bottom parts required by this order have been prepared, according to the most detailed specification on the tags, they are arranged according to sizes and widths, in lots of

twenty-four, just as the uppers were arranged in the Stitching Department.

These lots are then sent forward to the Making Room where they arrive at the same time as the uppers.

CHAPTER IX

THE MAKING DEPARTMENT

GOODYEAR WELT SHOES

ASSEMBLING

The first work in the Making Department is called *assembling*. This means the bringing together of all the parts we have seen prepared in the other departments. The finished uppers from the stitching room and all the necessary stock from the sole leather department are sent forward at the same time and placed in the hands of the workmen in this department.

To begin with, the proper lasts for each lot of shoes are selected. The reader will recall that the Goodyear last is to be distinguished by the metal plate that covers only the heel. Other lasts have plates that cover the entire bottom. The inner soles are tacked to the bottoms of the lasts by means of an *insole tacking* machine which drives the tacks automatically. This inner sole already conforms exactly to the shape of the bottom of the last, so that the operation at this point is merely one of attaching. The operator next pastes the box toes or stiffening between the leather toe tip and the lin-

ing of the upper; the counter is likewise placed between the leather and lining at the heel.

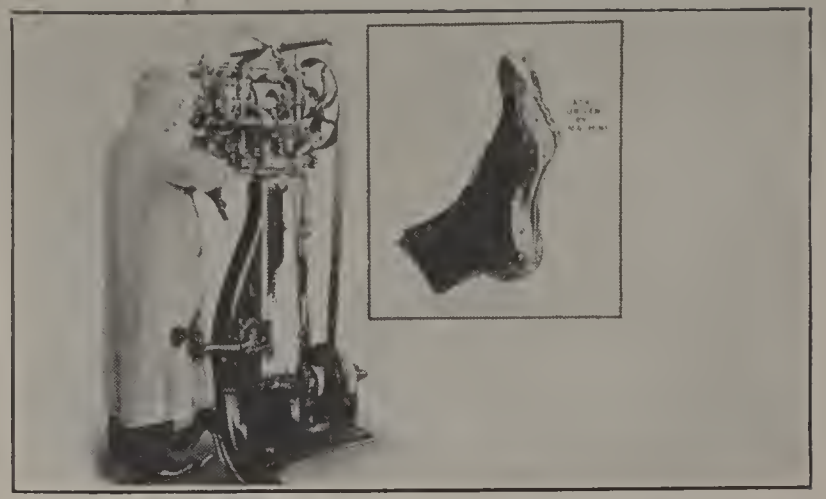
After these first steps have been taken care of, the last is placed inside the upper and put upon the spindle of the *assembling* machine. It is important that the seam at the heel be properly located. When the operator has adjusted the seam to the correct position he presses a foot lever of the machine and a small tack is driven part way in, to hold the upper in place on the last. Sometimes the hole made by this tack can be noticed near the back seam in a finished shoe. After assembling, the shoe is passed on to the operator of the *pulling-over* machine.

PULLING-OVER MACHINE AT WORK

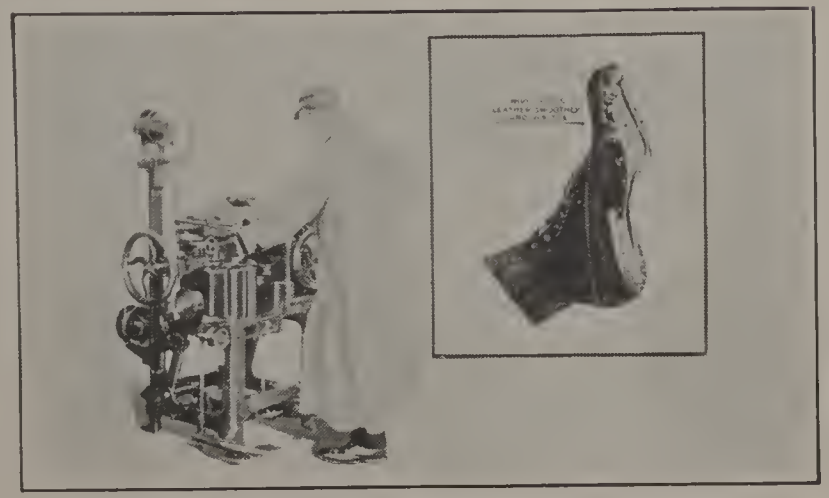
As we have already learned, this is one of the most important machines in the whole process of shoemaking. All the parts of the shoe upper have previously been cut to conform exactly to the shape of the last, and it is essential that they be correctly placed on the last if satisfactory results are to be obtained. This is the important work of the pulling-over machine.

The pincers of this machine grasp the leather at different points on each side of the toe. As this is being done, the operator, standing where he can see when the upper is exactly centered, presses a foot lever which causes the pincers to close and draw the leather securely against the wood of the last. At this point the machine stops

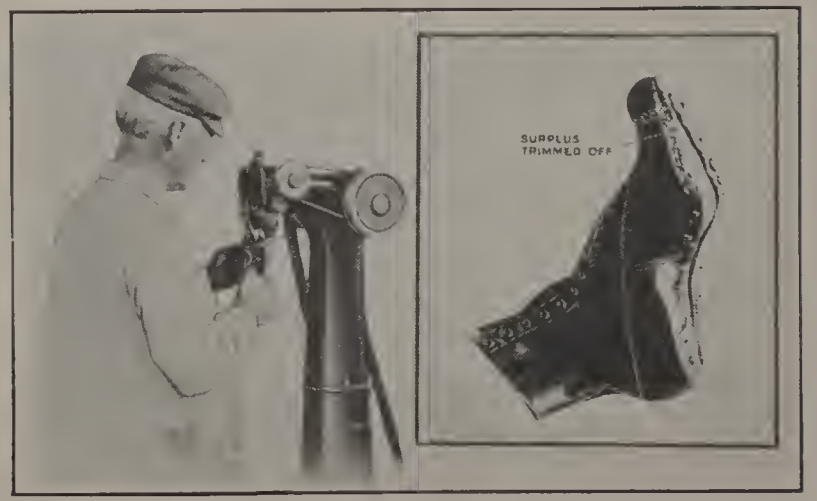
PULLING-OVER MACHINE



HAND METHOD WELT LASTING MACHINE



"BED TYPE" LASTING MACHINE



UPPER TRIMMING MACHINE

automatically and the operator, by moving different hand levers that control the pincers, is able to adjust accurately each part of the shoe upper to its correct position. Then the foot lever is again brought into play and the pincers move toward each other, drawing the leather firmly around the last. At the same time tacks are automatically driven — three on each side and one at the toe — to hold the upper securely in position. These tacks are driven only part way in so that they may later be removed without difficulty.

LASTING

The assembled parts as attached to the last are now ready for the *lasting* process. This is another one of the really difficult operations to perform properly. There are two types of machines that may be used for this work. One is known as the *hand method welt lasting* machine which operates on the principle of the pulling-over machine, except that it can be adjusted to pull over the leather all the way around instead of just at the toe. The other is called the *bed type lasting* machine.

This latter type is provided with a series of *wipers* for the toe and heel. These draw the leather over the last from all directions with a rubbing or friction motion, until perfect smoothness of the leather is obtained. After the leather has in this way been brought smoothly around

the toe it is held there by a fine wire fastened to tacks on either side of the toe. This wire takes a firm grip around the crimpled leather at the under surface of the shoe and holds it thus until it is ready to be fastened permanently in a succeeding operation. The portion of leather left over at the heel is forced smoothly against the insole and held there by tacks. These two operations of fastening the leather at the toe and heel must, of course, be completed before the wipers of the lasting machine are released.

The hand method machine, as used for lasting the sides, has been given that name because of the almost human way in which it performs its work. Like the pulling-over machine it not only pulls the leather tightly into place but it holds the parts in position while the tacks are being driven.

In all the lasting operations for a Goodyear welt shoe the tacks are driven only part way in, except at the heel portion where they are driven through the insole and clinched against the iron heel plate of the last. All the other tacks are withdrawn so that the inside of the shoe will be perfectly smooth. This feature of smoothness and the absence of nails in the sole is one of the advantages of the Goodyear welt shoe.

After the shoe has been lasted it is necessary to keep it on the last for a few hours so that the leather may retain the shape to which it has been stretched. All the surplus leather that has been

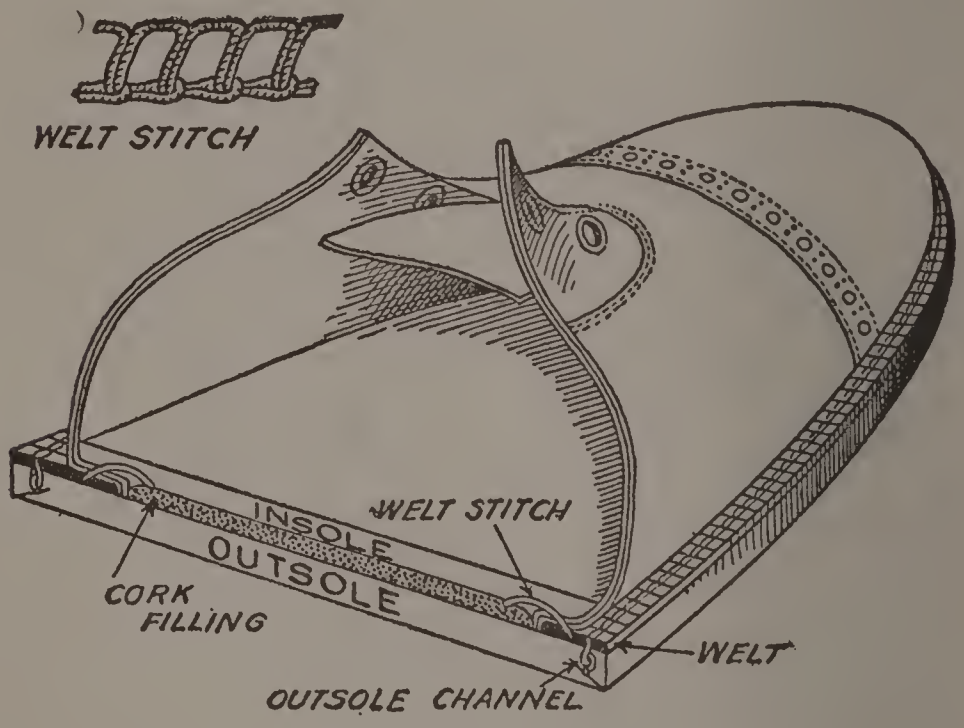
pulled over on the bottom of the last is trimmed off by a little *trimming* machine. This is provided with a knife that cuts away the extra leather very smoothly and evenly. A small hammer operating in connection with the knife pounds the leather flat around the bottom of the last.

The shoe is now almost ready to receive the welt. Before this can be done, however, the lasting tacks must be removed. This work is done by the *tack-pulling and resetting* machine. It is equipped with a pair of jaws that grasp the tack beneath the head, withdraw it, and then throw it into a tube leading to a tack-container at the back of the machine. At the same time it drives other necessary tacks in place so as to hold the shoe upper in correct position. This type of machine is employed, however, only in those cases where the heavier and coarser leathers are used.

On both men's and women's welt shoes made from light leather the *upper stapling* machine is used. This machine forms and attaches a small staple fastening made of wire. This staple securely holds the shoe upper to the channel lip of the inner sole and thus permits of the removal of the original lasting tacks. Formerly there was a considerable loss of time and a loss of needles through breakage. In sewing the welt the needle would often strike an "anchor" tack and snap off. The staple eliminates this defect.

IN-SEAMING

The welt, as we have already seen, has a narrow groove cut near the edge, to receive the thread of the *in-seam*. "In-seam" is the name given to the seam that joins the insole to



the upper and the welt. This is the work of the famous *Goodyear welt sewing machine* from which the shoe derives its name. A specially designed curved needle made for the purpose, passes sidewise through the inside lip of the insole, through the edge of the upper which was pulled over, and finally into the groove of the welt. See also the drawing on page 144.

The needle in making this stitch does not go inside the shoe but passes through only a portion

OPERATING THE GOODYEAR WELT
SEWING MACHINE
(This machine is also used for sewing Turned shoes)

of the insole, leaving the inside perfectly smooth. Every completed movement of the needle forms a stitch of great strength that holds the welt, upper and insole together. The sewing thread for this operation is really an important item. It performs a very useful service and is required to withstand a considerable amount of wearing strain. It is made of strong linen and is thoroughly waxed in order to give it greater wear-resisting qualities.

After the shoe has been sewn, the surplus leather around the inseam is trimmed off by machine to permit the outsole to lie flat against the seam. The knife that does this trimming is saucer-shaped and runs at a high rate of speed. It does its work accurately; trimming off all extra leather down to the stitches.

The tacks that held the insole in its proper position on the last are now pulled. This is done on the *insole tack pulling* machine, and the shoe is then ready for the next operation.

WELT BEATING

When the welt is first stitched to the insole it stands out almost at right angles as the result of the position in which it is sewn. It is necessary of course, that the welt should lie flat with the sole. In order to get this position the shoe is passed to a *welt-beating* machine in which a little hammer passes back and forth with a rapid

vibrating motion and beats the welt down until it stands out evenly from the side of the shoe like an extension sole. As the welt is turned around the forward position of the shoe in the sewing operation, it has a tendency to draw more tightly at the toe. This strain is relieved by a knife in the beating machine that cuts diagonal slits in the edge of the welt. The cutting is controlled by the operator.

The bottoms of the shoes, between the edges of the welting are now filled with a preparation of cork and rubber cement or other forms of specially prepared bottom fillers. This filling serves the useful purpose of leveling-off the bottom of the shoe. It makes up the difference occasioned by the addition of the welt, and also forms a pad for the foot. The cushioned surface given by the filling allows of enough resistance so that the prominent foot joints may form a "nest" for themselves. This can be noticed by placing the hand inside a shoe that has been worn for some time. It will be found that the sole is slightly compressed at several places, forming hollows to which certain of the foot joints have adjusted themselves. This accounts for some of the added comfort that comes in wearing a "broken-in" shoe.

Continuing along to the next step in the manufacturing process, a steel shank is now tacked to the shank of the shoe to support the arch and help keep the shoe in shape.

SOLE LAYING

The bottom of the shoe, including the welt, is now given a coating of rubber cement. The inside surface of the sole, that is, the side that is to go next to the insole, is also coated with cement. This is allowed to dry to a certain degree, after which it is applied to the bottom of the prepared shoe by means of the *sole laying* machine. In this machine there is a rubber padded mould made in the exact shape of the sole. The shoe first is adjusted to the machine by being placed on a spindle suspended directly above the rubber mould. Then the sole with cemented surface is pressed against the bottom of the shoe, and finally the operator, by pressing a foot lever, causes the shoe to descend into the rubber mould. Additional pressure is now added so that the entire surface of the sole becomes pressed against the bottom of the insole and welt. Here it is allowed to remain a sufficient length of time for the cement to "set" properly. This cementing is done for the purpose of holding the sole in place for the operations that follow.

ROUGH-ROUNDING

The next operation is that of trimming the outer sole and the welt so that they will extend an equal distance from the edge of the shoe. The *rough-rounding* machine does this. To

meet style requirements it is often desired to have the sole edge extend out farther on the outside of the shoe than it does on the inside and also that the width of the edge be considerably reduced in the shank of the shoe. All this is provided for with great accuracy by the rounding machine. The workman is able to control these operations by a simple adjustment of the machine so as to trim the sole to meet requirements for different styles of shoes. Still another feature is that the machine will trim the sole to conform exactly to all others of similar size and design.

Until a comparatively short time ago all sole rounding was done by hand by expert workmen especially skilled in this one operation. It was a slow and costly process. However, it has finally been reduced to a machine operation and this has done much to bring about a uniform and attractive product from the standpoint of correct sole rounding. While the edge is being rounded, a knife attachment on this same machine cuts a channel around the outside edge of the sole. This is to cover the stitches that will later be made through the welt and the outer sole.

In some few cases the channel is not cut in the sole and consequently the stitches are made to extend directly through the welt and outer sole. This method is what is known as "stitching aloft."

HEEL-SEAT ROUNDING AND CHANNEL OPENING

The surplus portion of the sole about the heel-seat is now trimmed off on a machine made for that purpose (*heel-rounding* machine). The shoe then goes to the *channel-opening* machine which turns back the lip of the channel in the outer sole so that it will be open to receive the stitches to be made later in attaching the outer sole and welt.

OUTSOLE RAPID LOCKSTITCH MACHINE

Continuing along to the next process of manufacture, the outer sole is stitched to the welt by the *outsole rapid locksmith* machine. The position of this stitch can be seen in the cross-section illustration on page 154. The seam made by the lockstitch machine extends from the channel in the outer sole to the top surface of the welt, where the stitches may be seen when the shoe is finished. The machine is fitted with a curved awl to punch the holes through which the needle passes. The needle follows the awl, carrying a hot waxed thread that joins with a bobbin thread underneath to form a lockstitch.

Almost everyone has had occasion to notice how durable this seam is. Even after the channel lip is worn through on the bottom of a shoe, and after the outer part of the stitches has worn off, the seam still holds the sole securely in place. It is possible to make finer

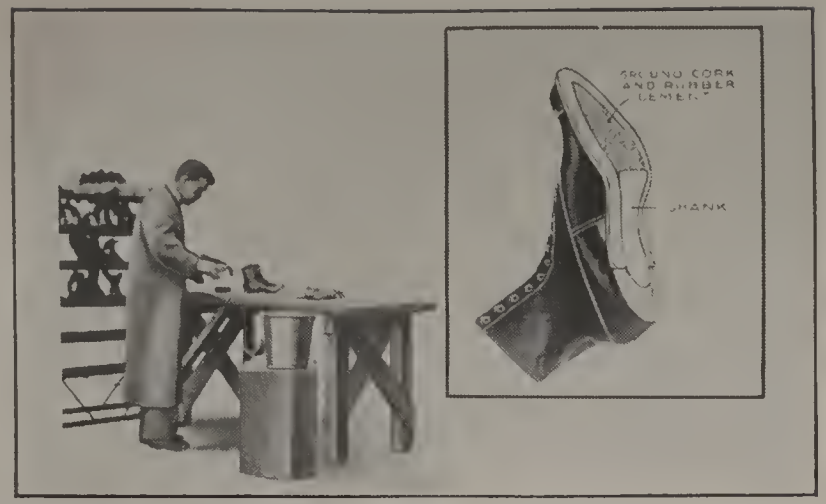
stitches and to sew along a much narrower edge with the rapid lockstitch machine than with any other used for sole-attaching purposes.

CHANNEL CEMENTING AND LAYING

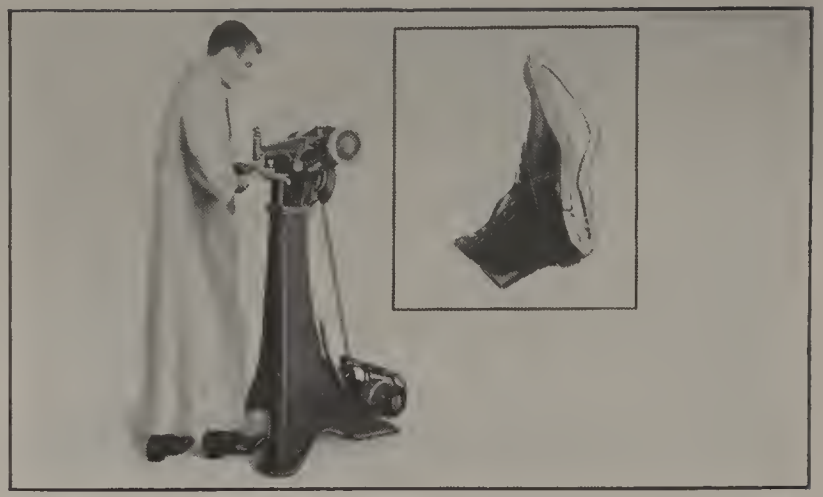
It will be recalled that in a previous operation the lip of the channel was turned back to admit the stitches. Now that the stitching has been completed the next operation, therefore, is that of closing the channel over the stitches. This is accomplished by the use of cement which is applied by a special machine. After the cement has been permitted to "set" sufficiently, the lip is forced back into its former position by a *channel laying* machine. This machine does its work so perfectly that a person not thoroughly familiar with shoes and the manufacturing operations is oftentimes unable to locate the channel.

SOLE LEVELING

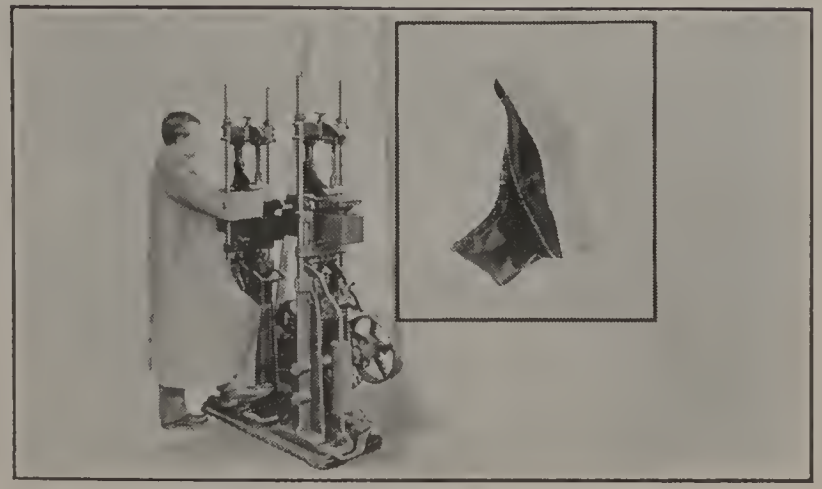
The shoe is now ready for the *sole leveling* operation. The purpose of this is to remove all unevenness in the sole. The machine that does this work is provided with two jacks or spindles. On one of these the operator places the shoe to be leveled. He then presses a foot lever and the shoe passes automatically beneath a vibrating roller under heavy pressure. The roller passes back and forth over the sole, from the toe



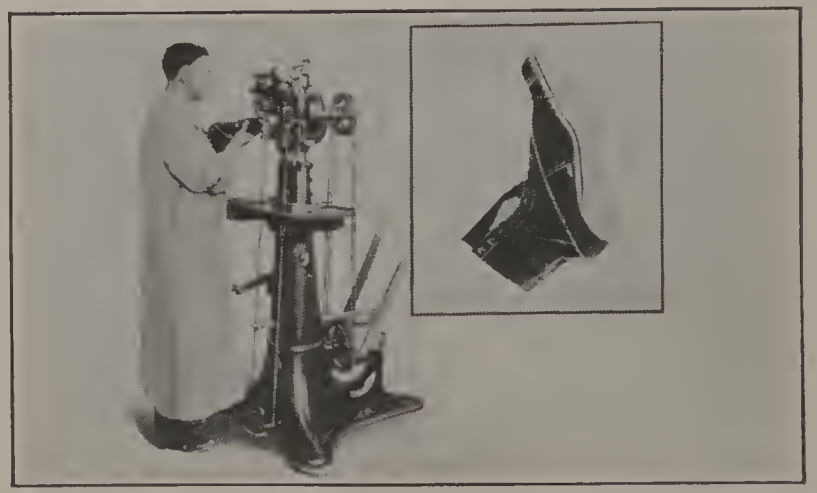
PLACING SHANK AND FILLING BOTTOM



WELT BEATING AND SLASHING MACHINE
(Welt Made to Stand Out Evenly)



SOLE LAYING MACHINE



ROUGH ROUNDING MACHINE
(Sole Roughly Shaped and Channel Cut)

into the shank and back again several times in a regular series of motions. While one shoe is under pressure the operator sets to work preparing a second shoe in the other spindle so that it will be all ready for rolling by the time the leveling of the first shoe has been completed. The graceful curve at the shank of the shoe is also part of the work done by the leveling machine.

HEELING MACHINE

The work of manufacture has now advanced to the point of attaching the heel. The heel of the shoe is nailed in place by the *heeling* machine, which does its work very rapidly and perfectly. The shoe is first placed in position on a spindle. Then the heel nails, which have already been set automatically in the holes of the plate, are swung into position exactly over the heel. The attaching is then completed by pressing a foot lever. All the nails are driven at one time, through the heel and the inner sole, until they strike the metal plate on the heel of the last. This bends them back and clinches them on the inside of the shoe. The nails are driven in such a way that the heads will extend above the heel about a sixteenth of an inch. This is done in order that they may be used to hold the top lift, which is next placed in position. In attaching this the operator again presses the foot lever. The machine then forces the top lift down over

the heads of the nails and fastens it. This operation is called *blind nailing*.

The top lift is placed so accurately in position on the shoe in this operation that it serves as a guide in later operations in finishing off other portions of the heel.

The small pieces of metal that show on the outside of the heel on the finished shoe are called *slugs*. These actually are not nails but rather are short pieces of wire inserted around the outer edge of the top to protect it from wear. The *slugging* machine that does this work is equipped with a continuous coil of wire. It drives the slugs accurately and cuts them flush with the outside of the heel at a high rate of speed.

The slugs are made in a variety of sizes and designs in steel, brass or other metals. As originally prepared they come in the form of wire coils, and are later cut off by the slugging machines as each slug is driven into the top lift of the heel.

HEEL TRIMMING, BREASTING AND SCOURING

The heel is trimmed by the *heel trimming* machine. This is equipped with a set of knives that revolve very rapidly and cut away all the rough and excess parts of the leather, leaving the edge of the heel quite smooth and in the shape desired. The top lift is always made in

the exact size required for the bottom of the heel. It is cut according to the measurements of the designer's pattern and therefore is absolutely accurate. The operator, therefore, uses the top-lift as a guide when he trims the heel.

The front of the heel, known as the *breast,* is shaped on a special machine in which a knife, with one downward stroke, cuts smoothly through each lift of leather to the exact point at which the heel is joined to the outer sole. The *heel-breasting* machine that does this work is adjusted so that the cutting is automatically checked at the instant the desired thickness of the heel has been cut. This prevents any possible cutting into the shank portion below the heel.

The sides or edges of the heel are now scoured to make them perfectly smooth and even. The machine used for this work has two rolls on which sandpaper is fastened. The heel is held against the sandpaper and the operator turns the shoe around until the desired shape and smoothness of the heel are obtained.

Trimming is the next step in the process. The edge, which was left slightly rough from the chopping motion of the rounder, is now trimmed and given the desired bevel on the edge of the sole, by the *edge trimming* machine. The cutting instrument of this machine is a small wheel made up of a series of sharp blades. These revolve very rapidly and trim away the leather smoothly and evenly.

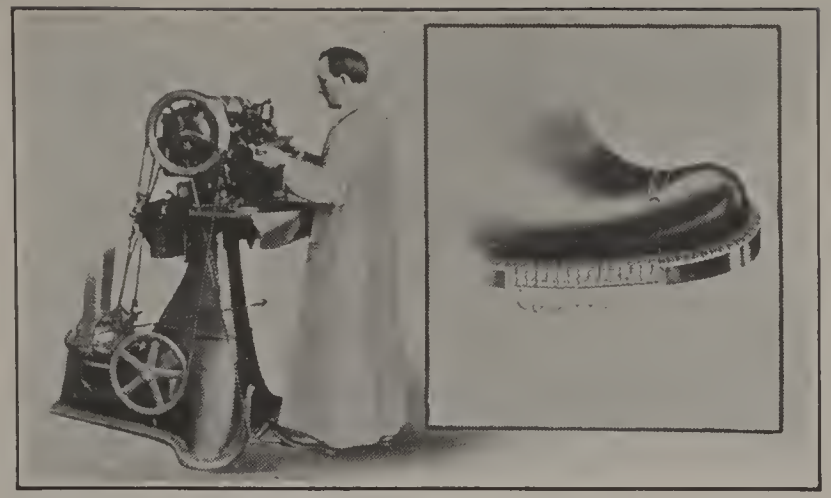
EDGE FINISHING

The upper surface of the extension sole, which is really the welt, is now trimmed and rubbed down hard to prepare it for the final finishing operations. The small ridges that are always to be seen between the stitches at the edge of the sole, are produced by the *stitch-separating* machine. This serves the purpose of smoothing down the stitches and giving an ornamental finish to the welt. The edge is then burnished to give it a hard finish.

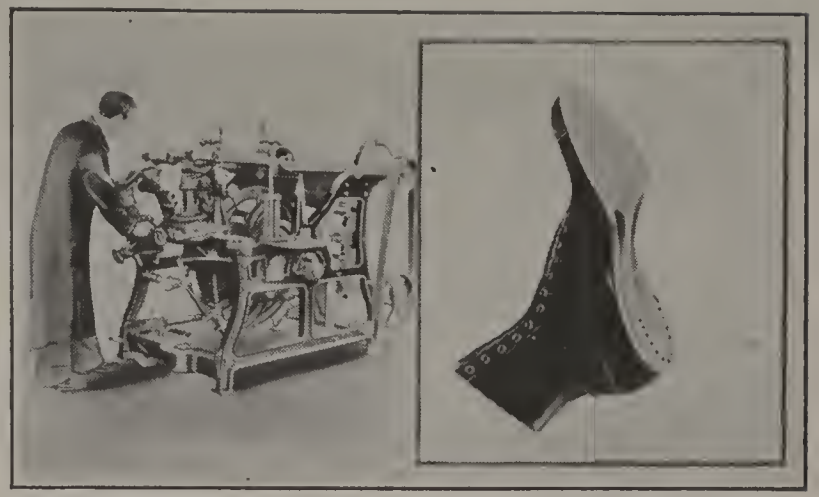
Following along to the next stage, the edges of the sole and the welt are given a coat of special blacking and are then sent to the *edge-setting* machine to be set and burnished. This machine is equipped with two hot irons, shaped to fit the trimmed edges. The edge of the sole is held against them as they move to and fro. This produces a hard and lasting polish.

HEEL BLACKING AND FINISHING

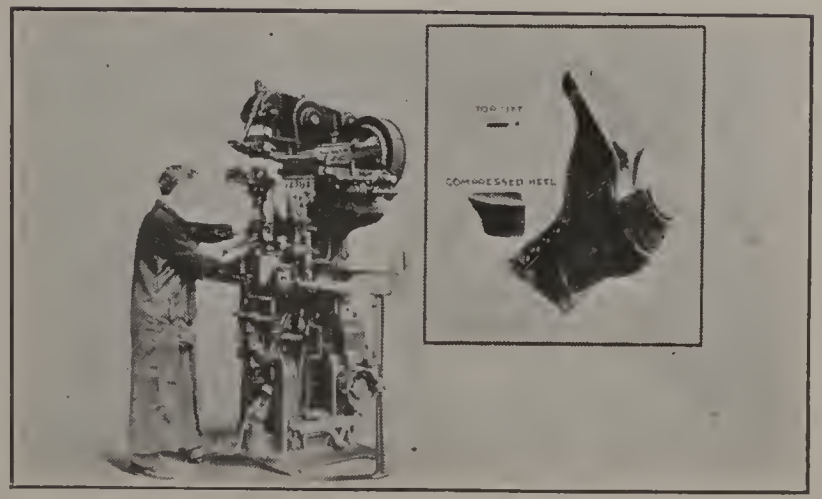
The top lift and the breast of the heel are scoured to produce a clear smooth surface. The edge of the heel is then given a coat of blacking or ink on the *heel blacking* machine. This machine is equipped with a small tank of ink. From this the ink is fed to the surface of two revolving brushes. By holding the heel against the brushes, the edge is thoroughly coated with ink. It is then ready for the *heel-finishing* machine.



OUTSOLE RAPID LOCKSTITCH MACHINE



AUTOMATIC SOLE LEVELING MACHINE



AUTOMATIC HEEL LOADING AND ATTACHING MACHINE

FINISHING SHAFT

Here we have a peculiar iron wheel that is heated and arranged so that hot wax can flow over its surface. The heel is held against the wheel while the ink and hot wax are rubbed into the leather. A revolving pad and brush on the same machine give a shiny and durable finish to the heel.

BUFFING THE BOTTOMS OF THE SOLES

The bottom of the shoe is also scoured. This work is done by two revolving rolls covered with sandpaper. The purpose of the scouring is to remove any stains or markings from the surface of the leather so that it may be given a smooth, glossy finish. The shank portion of the shoe cannot be buffed with these rolls because of the curve. For this purpose, therefore, a special *buffing* machine is used. This is provided with a rubber pad covered with emery cloth, which revolves very rapidly. An air pump with which the machine is fitted, keeps the rubber pad constantly puffed out with air. The double purpose of the air is to keep the cloth cool and to make the pad flexible so that it may readily be formed to the shape of the sole.

FINISHING MACHINES

The bottom of the sole and the top lift of the heel are blacked or stained and brought to a high-burnished surface on the *finishing* machine. This is equipped with a variety of

different types and sizes of brushes made of cloth or bristle. The operator chooses a particular type of brush from among these, according to the quality of the work being finished.

Another form of finishing machine is that called the *stitch and upper cleaner*. It is fitted with special brushes and is used to polish the stitches and leather along the edge of the welt. It is also used to brush off any dirt that may have accumulated on the upper leather during the many processes of making.

POWER STAMPING MACHINE

In order that the shoe may be identified, a trade mark or trade name is generally stamped on the bottom of the sole or shank. This work is done by a *stamping* machine that carries a heated die cut in the form of the desired marking. The machine may be regulated so that the die can be pressed against the bottom of the sole under any desired pressure and thus give a light or heavy impression of the trade mark, as desired. The final operations of treeing, packing and shipping are taken up in a separate chapter following.

GOODYEAR WELTING

IMPORTANCE

As has already been suggested, the Goodyear welt shoe derives its name and special character

of construction from the use of a *welt,* which is the narrow strip of leather serving as the connecting elemental between the shoe upper and the outer sole.

The relative importance of the part that *Goodyear welting,* that is to say, the welt itself, plays in modern shoemaking is too little understood by the layman. And even among people in the trade, not closely allied with the actual technical details of manufacturing, it is often a vague and mysterious subject. It is indeed important that the retail shoe salesman should have an adequate knowledge of the part played by the welt in the shoes that he fits and sells.

Most people know that many shoes are made by the "Goodyear Welt Process," yet not one in a dozen, perhaps, can identify a welt shoe when they see it. It is interesting to consider welting and the really great improvements in its production as a contributing factor in the steadily increasing favor and popularity of the Goodyear welt shoe.

Already the process of applying the welt in the manufacture of the shoe has been thoroughly explained. The purpose here is to devote special attention to a "close-up" study of the welting itself in order that the reader may thoroughly understand what it is, where it comes from, and the special processes of treatment through which it passes before reaching the shoe factory. All this, in turn, is reflected in the

finished shoe and consequently it vitally concerns the retail shoe salesman.

SKILLED WORKMANSHIP REQUIRED

The illustrations on page 175 show clearly the relative position of the welt in the shoe. The welting, however, must first be prepared by being grooved and bevelled. The latter operations were formerly performed in the shoe factory, but are now a part of the larger welting manufacturer's service. The grooving must be accurate to a hair's breadth and varies according to the style and grade of a shoe, the materials used and the size of the thread.

Another of the illustrations presented here shows the shoe with the welt "beaten out" and the sole laid and partially stitched to the welt. Here also fine workmanship and accuracy are essential. The outer-sole stitching is not only a basis of strength in the shoe, but it is often an ornamental feature that attracts the customer's eye. In modern factories great attention is given to the smallest details of this operation. The color of the welt, the number of stitches to the inch and the size cord are all important.

QUALITY

Emphasis has been laid upon the importance of accuracy and fine workmanship in these details pertaining to the welting. But this all be-

ATTACHING THE WELT

UPPER LEFT — Shows the Welt partly attached to the Upper, also untrimmed portion of the Upper Leather and Lining.
UPPER RIGHT — Welt completely sewn and Upper partially trimmed at the Sole.
LOWER — Sole laid and partially stitched to the Welt.

comes impossible unless welting of the finest quality is used. At no place in the shoe is quality more essential. The strain on this narrow strip of leather is a double one — both the inseam and outer sole stitch must stand the test. There is a strain from above and below. The welt must stand this double strain or the shoe when put to the test of wear, will go to pieces. Any tender fibre, slack-tanned or punky stock will result in weakness at a point where it can least be afforded. In shoes made by the Goodyear welt process the welting is the *keystone* — the connecting link that holds uppers and bottoms together.

EARLIER METHODS OF PREPARING

In the early days of welt shoemaking the welt was stripped, in the form of a single welt, from a piece of sole leather. In other words, it was made long enough for welting one shoe. Although such a welt may have been cut from firm solid stock, it was not the specially selected material such as that now utilized by manufacturers who specialize in the making of welting. The welt must not only be good leather, but it must also be mellow, pliable, smooth, tough, uniform throughout, non-stretching, exact in width and substance.

To secure all these attributes it has been found as the result of long experience, that double oak

belting shoulders are best for the purpose because of their open fibres combined with natural toughness. Welting, therefore, is cut from the shoulders, and these are tanned and curried by processes designed solely to produce welting meeting the varied requirements already mentioned.

The old system of cutting a single welt was wasteful because it did not allow of cutting the leather in exact lengths to fit each shoe. As a result, it later became customary to cut welting in longer lengths, averaging twenty-five to thirty yards. This method, of course, made it possible for the careful workman to use only the exact length needed in each shoe. Even in spite of this advance in method, however, there was almost certain to be a waste of from one to as much as twenty inches at the end of each of these longer strips. An average of 21 inches of welting is required for each shoe and consequently there was a loss of all short pieces left over.

CONTINUOUS WELTING

As the cutting down of waste is the true basis of efficiency, so the problem of eliminating entirely the loss due to short ends in welting was studied. Within recent years one of the larger welting manufacturers has solved the problem with a method whereby "endless" welting is produced. This is accomplished by skiving or

UPPER FIGURE — Method of uniting two cemented ends of Welting to produce a continuous length.
LOWER — A Hank of Welting as supplied to the shoe manufacturer.

scarfing the end of each strip of welting, cementing this scarfed end and enclosing the end in a little wax paper envelope. When the operator approaches the end of the length on which he is working, he removes the paper guard, does likewise with the next hank he is to use, brings the two cemented ends together by a simple pressure of the fingers — and thus produces continuous, or endless welting. This eliminates completely all waste from short ends. In these days of leather shortage, the saving of leather in any way is to be recommended. The saving that may be effected even in this small item amounts to a considerable figure in the course of a year's time.

The amount of such saving as well as the importance of the welting industry as a highly specialized business may be gauged from the statement that the annual production of welt shoes in the United States is estimated at 110,000,000 pairs. These shoes require on an average not less than a yard of welting per pair — rather more on men's and considerably less on misses' and children's.

MANUFACTURING PROCESS

Originally welting was made up in rolls, like cart-wheels. The improvements that have been made, particularly the development of the "endless" feature and the desirability of having

longer lengths, have resulted in a change from rolls to *hanks* as illustrated. These are now made up in 50-yard lengths. The manufacturing process is an elaborate and extensive one, requiring large factory space and including many operations. Today practically none of our American shoe manufacturers make their own welting. It is a specialty business by itself.

The double shoulders in the rough form require a very painstaking and elaborate series of cleaning operations before they are ready to be stripped into welting. All foreign substances that make leather stiff and heavy must be removed. Also certain oils and greases must be provided to make mellow, pliable stock. Wrinkles must be ironed out and flesh scoured off. The shoulders must be split and re-split to uniform substance according to the weight desired in the finished product. Following this there are several other important steps in the process. The names indicate the general nature of the work: Sorting, stripping, scarfing, matching, splitting, dividing, grooving, measuring, etc.

Various colors are possible in welting although the bulk of the business is on the standard black and natural grain colors. Shades of mahogany and brown are used to a certain extent and in recent years a white welting has been developed that is increasingly popular. However, the expense of the white prohibits its use in all except the better grade of shoes.

VARIETY OF DEMAND

Welting is sold by the yard and, of course, varies in price according to the quality and size. The range of sizes is remarkable. They embrace everything from a 7-16″ (width) × 3-64″ (thickness), which is a light, narrow strip for women's fine shoes, to the heavy and wide $\frac{5}{8}'' \times \frac{1}{8}''$ used in the heavy double-row-stitched workshoes made so extensively in the Northwest.

It is noticeable that European shoe factories buy wider welting than do the American manufacturers. Abroad the $\frac{5}{8}''$, 11-16″, and 6-8″ widths are very common on men's shoes, whereas the average in the United States is $\frac{1}{2}''$ and 17-32″. There appears to be a double reason for this. First, wider sole patterns are used abroad and there is an apparent preference for wide extensions that do not appeal to American buyers; and second, there is the evident fact that European manufacturers are not inclined to split hairs and watch the waste items as closely as do their American competitors.

RELATION TO SHOE REPAIRING

A present-day phase of the shoe business in which welting plays a considerable part is brought about through the custom of most people to have their shoes re-soled. The high cost of everything, including footwear, impels the prudent man or woman to get the utmost

service out of the goods purchased. We all know that the shoe repair business has vastly increased recently. A Goodyear welt shoe, to stand re-soling must, above all else, have been originally made with a good piece of welting. The old sole must be ripped off — which in itself is a considerable strain on the welt — and the original welt must again stand the test of re-sewing the new sole, and continued wear thereafter. Obviously, it is only a good welting that will be able to stand the test and thus give satisfaction to the wearer under all circumstances throughout the life of the shoe.

CHAPTER X

McKAY AND OTHER METHODS OF ATTACHING

McKAY METHOD

RELATIVE IMPORTANCE

In the preceding chapter special attention has been given to the Goodyear welt method of attaching the sole. The reader understands, of course, that this is simply one of several methods of attaching in general use today throughout the shoe-manufacturing industry. It is true that more shoes are made in the United States by the welt method than by any other in use. At the same time, there are a great many McKay shoes, turns, stitchdowns, and other types handled by the retail shoe salesman in serving his trade, and for that reason it is important that he be thoroughly familiar with them.

From the standpoint of popular usage the McKay method of attaching soles is second in importance only to the Goodyear welt method. Throughout all the operations of preparing the upper, as already considered, the process is almost exactly the same in making for both welt and McKay shoes. The only difference is that

for the latter type of shoe a sole lining, known as a *sock lining*, is provided. The purpose of the sock lining will be explained later.

In the sole leather where the bottom parts are made, there is another variation. Here the inner sole for a McKay is not channeled because there is to be no welt used. There is no difference in the preparation of any of the other bottom parts.

LASTING

In the assembling room the proper McKay lasts are selected. It will be recalled that the McKay lasts have a metal plate covering the entire bottom. This is in contrast to the Goodyear last which has a metal heel plate only. In the plate on the bottom of the McKay last, two small holes in the center are provided so that nails may be driven through the inner sole into the wood of the last. This is necessary to hold the inner sole in place until the uppers have been pulled over and lasted. The nails are then removed.

After the inner sole has been tacked to the McKay last, the upper is drawn on and the shoe is ready for the pulling-over and lasting machines. In the course of these operations, the *lasting tacks* are driven all the way through the pulled-over edge of the upper until they hit the metal bottom of the last. (The lasting tacks are those used to hold the upper to the inner sole.) In striking the metal of the last the tacks

become clinched, that is, turned over flat in such a way that they cannot be readily removed. The lasting tacks, therefore, remain permanently in the inner sole of the McKay shoe, instead of being removed before the outer sole is applied, as in the case of a welt shoe.

These tacks are necessary because, in order to stitch a McKay sole, the last must first be removed. Therefore the tacks must remain to hold the upper and inner sole together after the last has been taken out. Before this is done, however, the shank piece is tacked in place and the bottom of the inner sole is filled in with ground cork and cement or with tarred felt. This is done so as to bring the middle of the sole to a level with the turned-under leather around the edges, in the same manner that the welt shoe is filled in. Sometimes leather is used for filling but most manufacturers prefer cork filling as it prevents squeaking, acts as a moisture resistant, is lighter, and costs less.

After the completion of the work of filling, the outer sole is tacked into position and when sufficient time has been allowed for the upper to "set," the last is withdrawn.

McKAY SEWING MACHINES

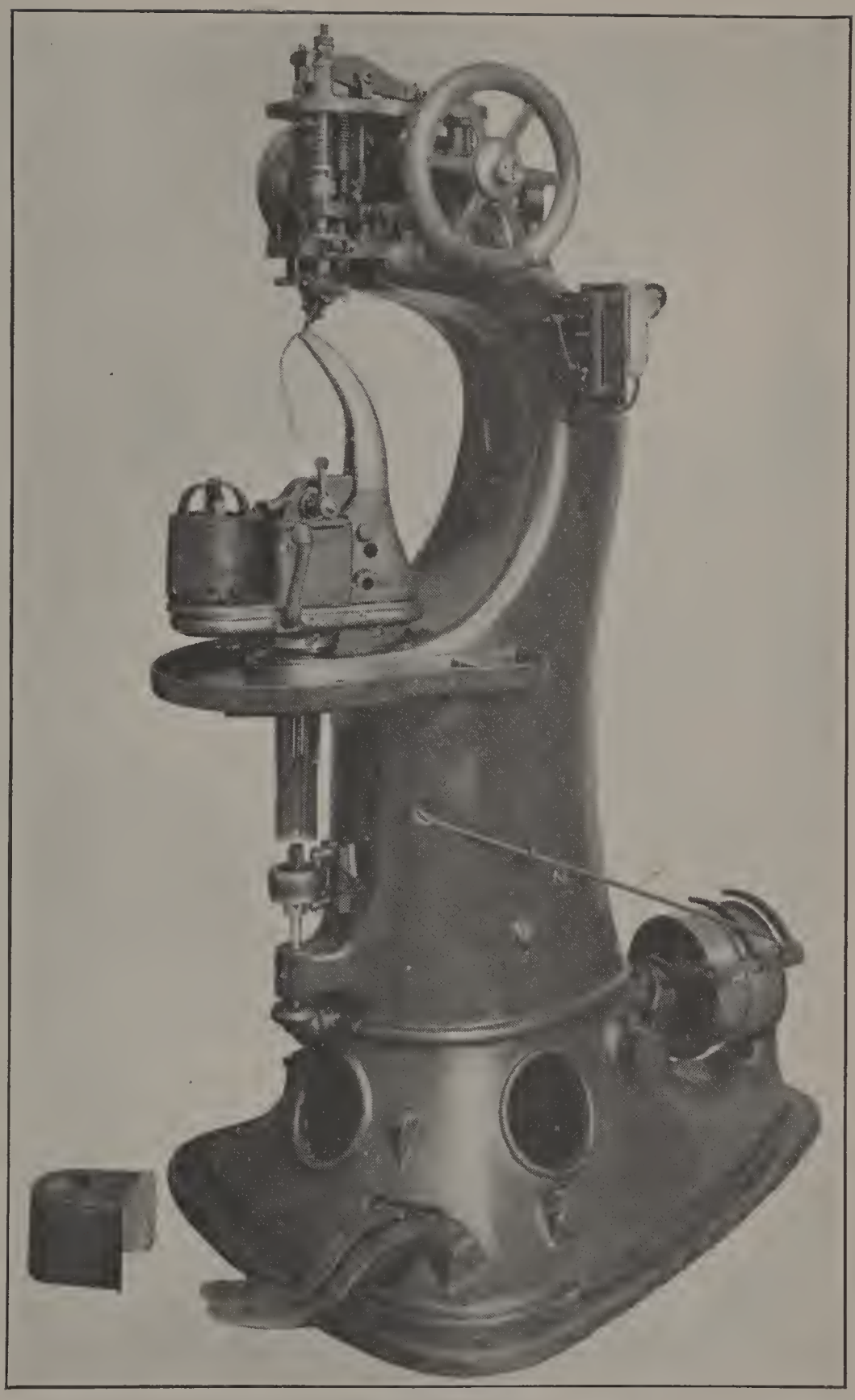
On the McKay machine there is a spindle-like part known as the *horn*. This can be clearly seen in the photograph. At the tip of this horn is a little mechanism for catching and

looping the thread. The horn is on a pivot so that it can be turned in any direction. It is over this horn that the shoe is placed for stitching; that is, the horn is inserted into the shoe. When adjusted in this way, the shoe is necessarily upside down, with the end of the horn pressing against the inner sole.

Continuing with the operation, the horn with the shoe over it is next adjusted so that the needle comes into position at the breast of the heel and is then ready for operation. A straight needle is used for this work because the stitches go straight through both the outer and inner soles and are made from the outside of the shoe.

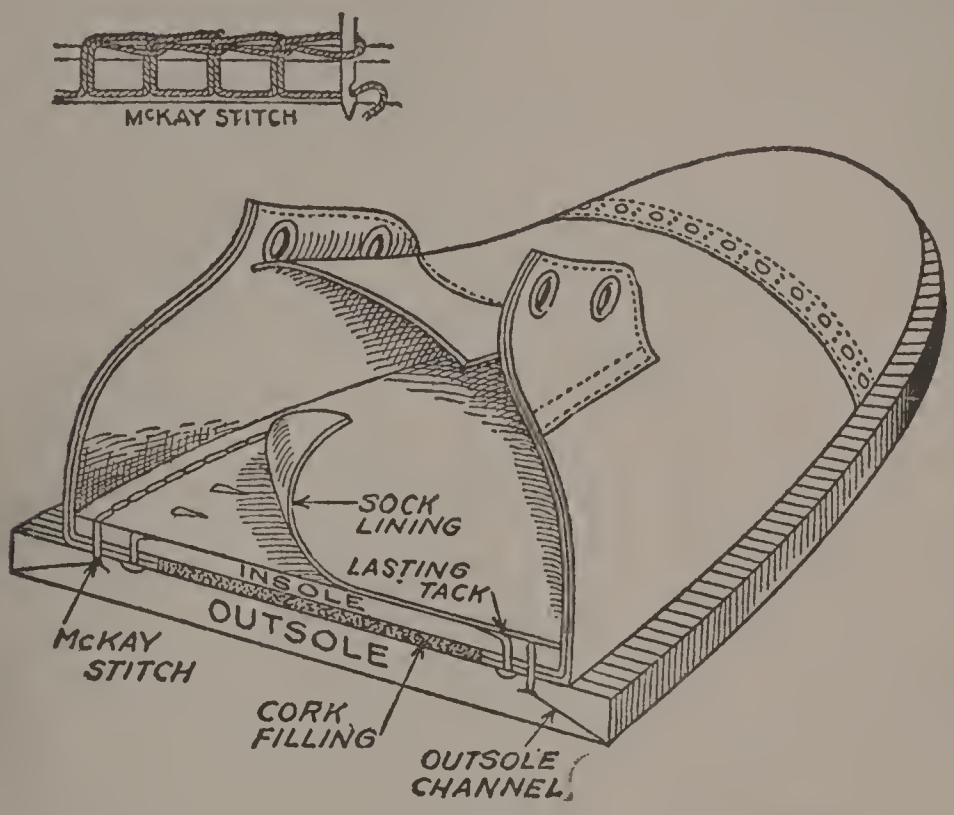
CHAIN STITCHING

The McKay machine makes a chain stitch. This is accomplished by the means of the little whirl or looper in the horn. The needle passes through the sole and into the tip of the horn. There the thread is caught and turned in a loop over the point of the needle. As the needle withdraws it brings the loop up also and carries it along in the channel of the outer sole to the point for the next stitch. The needle then descends again for another loop which is brought up through the first loop. In this way, stitch after stitch is linked with the preceding one — chain-fashion. The sewing is carried from the front of the heel on one side all the way around the shoe to the same point on the other side.



McKAY SEWING MACHINE
Showing the "Horn" Feature

The lower part of this stitching is laid on the surface of the inner sole. As very heavy thread is used for sole stitching, this makes a very notice-



able ridge that would be felt by the foot if some sort of covering were not put over it. Accordingly, a *sock lining*, which is usually made of thin leather or leather substitute, is pasted over the inner sole.

USE OF THE "FOLLOWER"

The only sure way to distinguish a McKay shoe from a Goodyear welt is by examining the inner sole under the sock lining for the ridge of stitching and the clenched ends of lasting tacks that are left in the shoes.

The heel of the McKay shoe is not applied while the shoe is on a last. The attaching is

done, after removal of the last, on a spindle or jack. This is a notable variation in method from that used in the manufacture of the Goodyear welt shoe. It will be recalled that the welt shoe remains over the last from the time it is first inserted, prior to the lasting operation, until it is finally removed in the Treeing Department. The last of the McKay shoe is removed after the leather has been given sufficient time to "set," following the lasting operation.

In order that the shoe may be more readily handled in the succeeding operations a form somewhat similar in shape to the wood last is now placed in the shoe. This is known as a *follower* or *filler*. It is generally made of a light material such as fibre. No great amount of strength is required in the "follower" for the reason that its function is not to form the shoe but rather to give it enough stiffness to allow of its ready handling by the workman in the succeeding operations of finishing, cleaning, etc.

In the succeeding operations of finishing the McKay shoe passes through the same process as those described in the previous chapter in connection with the Goodyear welt system and, therefore, will not be reviewed here.

McKAY WELTS

In order to meet certain demands of the trade there has been developed a McKay shoe with the outside likeness of a Goodyear welt. The

likeness is obtained by attaching a specially prepared type of welt to the outer sole. This is then stitched and gives the appearance of a shoe made on the Goodyear welt principle.

TURNED SHOES

OLDEST METHOD

The *turned* shoe dates back to those romantic days when the making of footwear was a simple matter of sewing two pieces of leather together wrong side out, and turning the seamed side in. Some time ago, the purchase was made of an interesting collection of antique footwear. Several of these pieces, which were found at the city of Antinoe in Egypt, are believed to be over two thousand years old; and they are all made with the sole seams turned in.

In the middle ages, one of the requirements for membership in the shoemakers guilds was the ability to turn a buskin or shoe without straining the seams. The workmanship of the turned shoe became highly skilled and probably the finest example of this skill was shown in the famous Wellington boot of the past century. These boots were not always light-weight and it seems quite wonderful that such a bulky thing could have been made inside out and then completely turned.

Fine shoes were always made by this method until the invention of the Goodyear *welt and turn shoe* machine. In fact, many people

of the passing generation still have their shoes hand-turned to order. In parts of Europe, shoemakers at the present time refuse to call a shoe "fine" unless it is hand turned. But this attitude is really more a matter of sentiment than of workmanship. The shoemakers of Vienna, for instance, were noted for many generations for their "fine women's turns." It is quite natural, therefore, that they should cling to the method for which they were justly famous.

The reader will recall that when the Goodyear welt machine was first conceived, it was the result of an effort to find a machine that could sew turned shoes. After it came into successful use for this purpose, the important idea of the curved awl and needle was later used for welt sewing.

MAKING OF TURNED SHOES

The turned shoe is made with an ordinary upper, usually of light weight, and with a single flexible sole. There is no inner sole in a turned shoe. The soles are channeled, trimmed and the sole edge is moulded into shape before lasting.

The sole is tacked to the last upside down and the upper is drawn over the last, inside out; that is, with the lining turned out. The counter must also be put in wrong-side-out. The shoe then goes to the pulling-over and lasting machines.

All tacks are driven only half way in, to hold the parts in place.

The upper and sole are sewn together on the Goodyear *turn shoe* machine. The seam is made through the channel in the sole and the edge of the upper by the curved needle, very much as the welt is attached to the inner sole of a welted shoe. The tacks are all withdrawn and the surplus part of the upper trimmed off. The last is next withdrawn and the shoe is ready to be turned.

Although many inventors have tried, no one has yet made a machine that will sew this type of shoe right-side-out. The turning of the shoe is now being successfully done by machine but considerable effort is still being put forth to improve upon present methods.

According to the hand turning method, which is still in use, the shoe is placed securely in an upright position over the end of a stationary rod. In olden days, a blunt-top broomstick often served this purpose. The operator bends the sole at the shank and with a skillful twist, reverses the heel part. The shoe is removed from the rod and the operator pushes back the toe. Then, with a quick skillful movement the forepart of the shoe is turned right-side-out. A last is now put back again into the shoe. This time, however, a slightly larger last is used to make up for the difference in size occasioned by the fact that the sole of the shoe has now been turned on

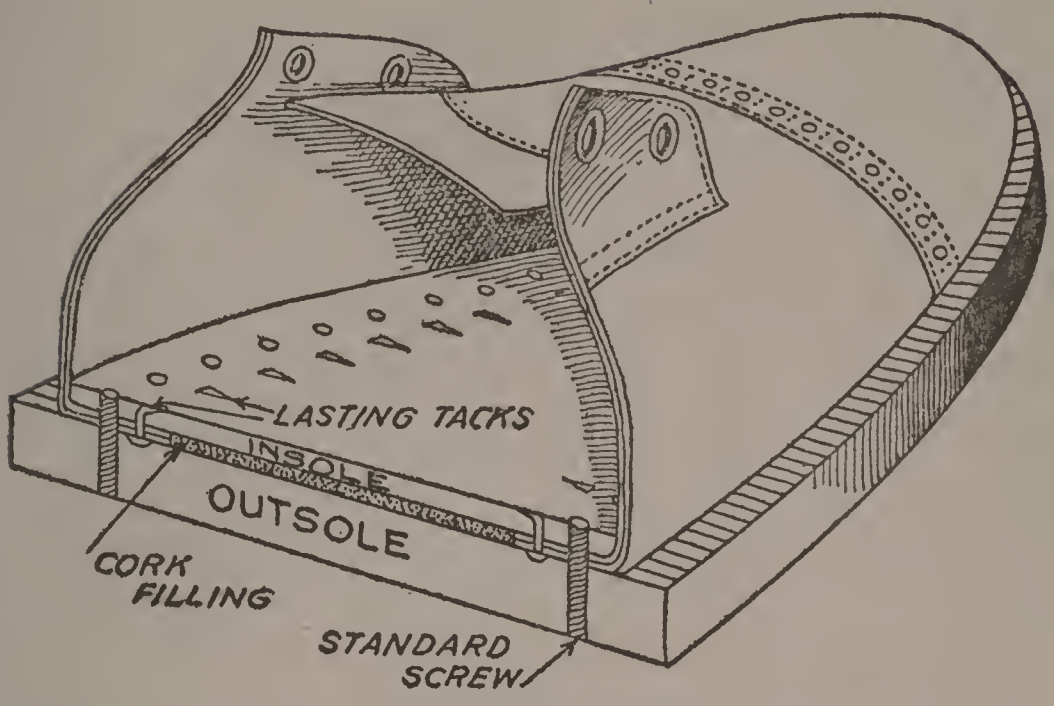
the outside. At the same time the workman exercises great care to straighten out any wrinkles that may form as the last is being forced into the shoe. This work of removing wrinkles is done with a flexible knife which is carefully worked around the entire inside surface. From this point on the finishing operations proceed in the same general manner as those already described.

The turn shoe has so many advantages in the way of flexibility and lightness — qualities desirable in fine shoes and slippers — that it is highly probably American inventive genius will some day solve the problem of sewing this type of shoe from the outside.

STANDARD SCREW, PEGGED AND NAILED METHODS

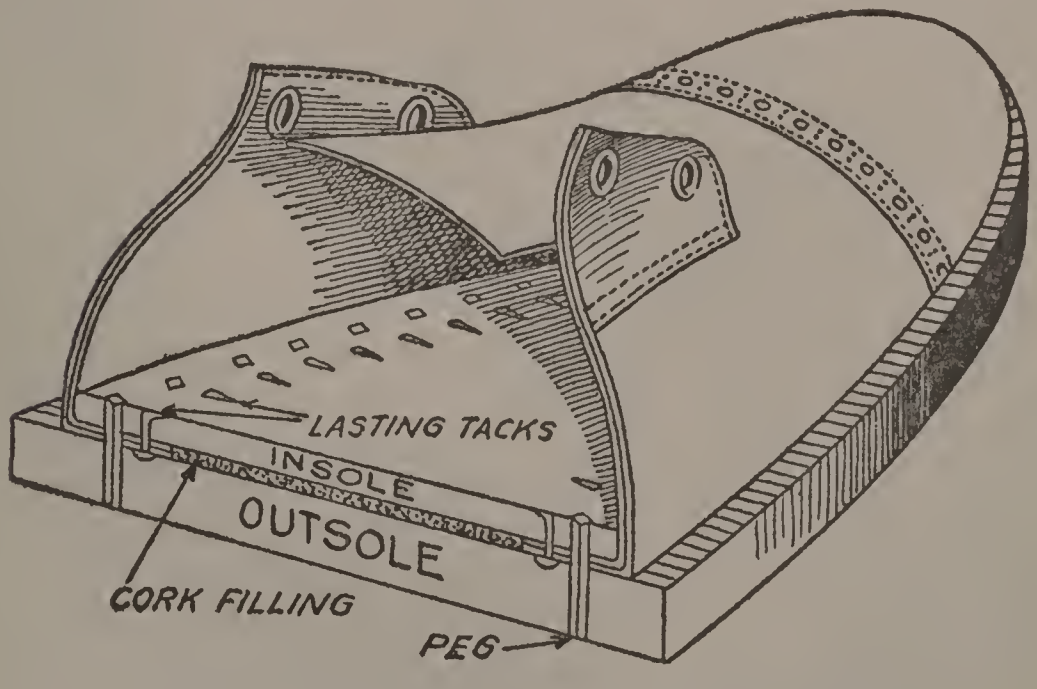
SIMILARITY OF THREE METHODS

The *standard screw, pegged* and *loose nail* processes are very much alike, except in the materials used for fastening the soles to the uppers. The pegged method was the first used for attaching heavy soles, and the other two methods came later. However, the pegged shoe continued in quite general favor until comparatively recent times. It was much more comfortable than the nailed shoe.



CROSS SECTION OF A STANDARD SCREWED SHOE

Showing direct method of attachment through the outsole, upper and insole



CROSS SECTION OF A PEGGED SHOE

The method of attaching with nails is similar to this, except that nails are used instead of the wooden pegs

In 1876, a Frenchman made a machine that would drive and cut wire from a continuous coil. This attracted the attention of Louis Goddu, who interested himself in the principle and was later able to perfect a machine to drive spiral wire. This wire, when cut in short lengths, resembles screws. The machine has a rapidly revolving head by means of which the spiral wire is screwed into the sole leather and cut off. This is known as the *standard screw* machine and it makes a very serviceable heavy shoe, although the sole is stiff and unyielding.

These shoes are made in practically the same way as the McKay shoe except that they are not stitched nor channeled. A comparison of the illustrations of these different methods will give the reader a clear idea of the points wherein they vary.

PEGGED SHOES

The pegged method has passed almost completely out of use except for very cheap, heavy boots. The machine used for pegging shoes, however, merits consideration. Benjamin F. Sturtevant was the inventor of this machine, which makes its own peg and drives it at one operation. A coil of beech wood, rolled like ribbon an inch wide and an eighth of an inch thick, is fed to the machine. When the machine is in motion, it cuts this wooden ribbon into pegs, one at a time, and drives them in until they

protrude on the inside of the shoe, where they are cut off by the machine. This cutting feature is the result of a later invention.

LOOSE NAIL METHOD

After perfecting the standard screw machine, Mr. Goddu turned his attention to the improvement of a nailing machine which is still in use. This is known as the *loose nail* machine, because individual nails are used instead of being cut from a coil. The nails are fed into a hopper, from which they pass into a slide that carries them down to the hammer. This hammer, in turn, drives them one at a time at a very rapid rate. They are clinched by striking a small cup-shaped attachment which moves along on the inside of the shoe as each nail is being driven.

The nail, as it is driven, is embedded in the sole and thus it adds somewhat to the wearing quality. However, the disadvantage of having nails on the wearing surface of the sole is that they often force themselves up through the inside of the sole and become a considerable annoyance to the wearer. Such a thing, of course, offsets any slight advantage in wearing service.

STITCH-DOWN SHOES

THE "FADE-AWAYS"

Probably no type of shoe has ever brought forth such a storm of disapproval as that pro-

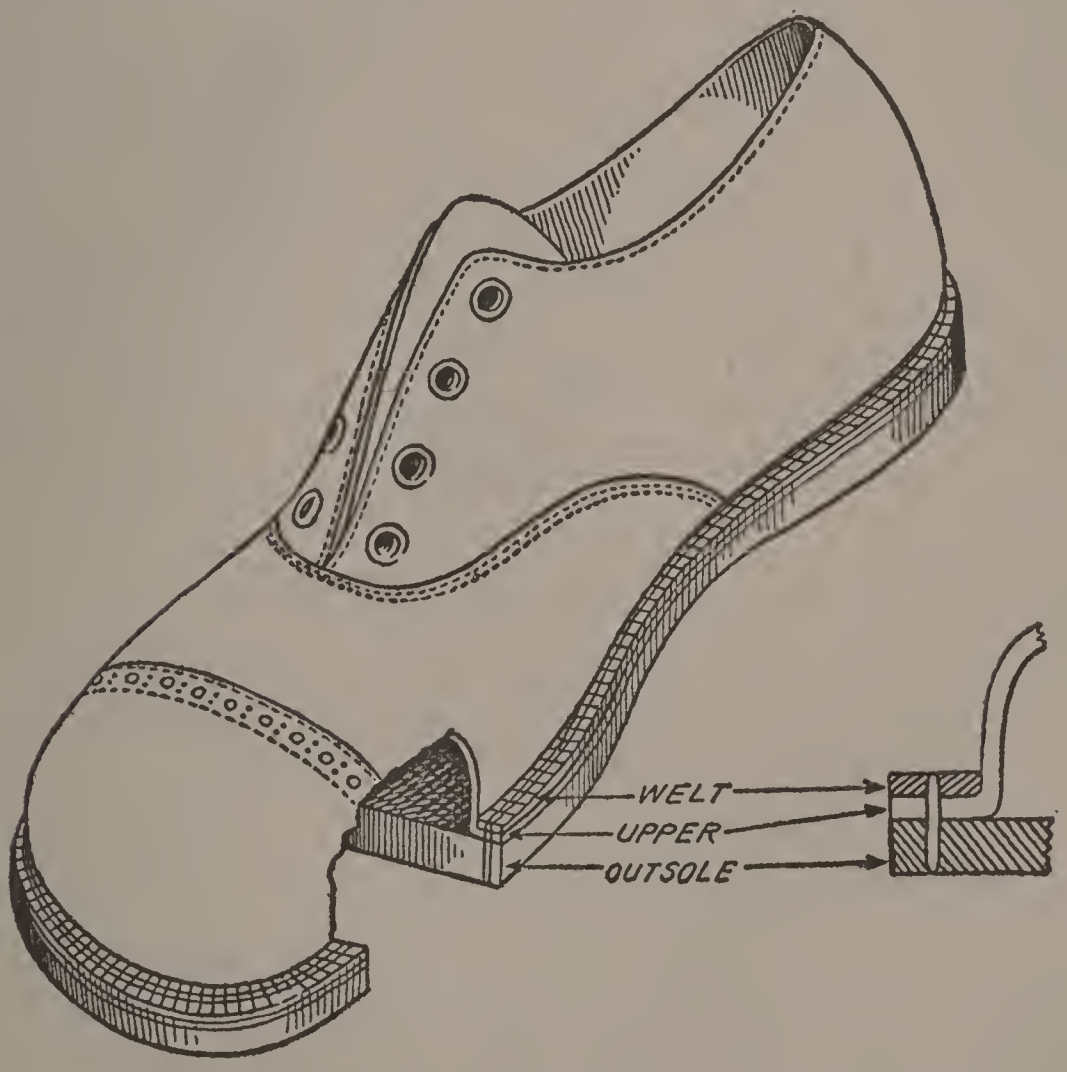
duced by the stitch-down shoes at the time of the Civil war. Thousands of shoes made by this process were sold to the government for the use of the army. Due to the peculiar flat-seam method by which the sole is attached, the stitch-down did not prove practical for marching purposes. The stitches pulled out very easily and after a long tramp over muddy roads, the soldiers would often find that they had lost their soles in the mud. Nothing remained but the uppers tied with shoestrings around the ankles. Accordingly the soldiers dubbed the shoes "fade-aways."

Such a tempest of public opinion was created by this barefoot army, that a splendid opportunity was thus brought about for the introduction of the McKay process. Practically the entire army had to be re-shod and Abraham Lincoln was quick to realize the advantages of Blake's machine. He encouraged Colonel McKay to put the new invention to work as quickly as possible. We have read of its success in an earlier chapter.

STITCH-DOWN PROCESS

The stitch-down method of attaching soles to uppers differs radically from all the methods that we have previously considered. To begin with, the last is not inserted until after the inner sole and upper have been stitched together. Instead of being pulled over the inner sole, the upper is stitched to it with a flat

"dressmakers" seam. That is, the edges of the upper and the inner sole are placed together and stitched like an ordinary seam. This leaves the edges of the seam on the outer side of the shoe at the sole line, as shown in the illustration.



This outside seam forms the extension to which the outer sole is stitched. Before this is done, however, the last is inserted into the shoe. In the better grade of stitch-down shoes, a narrow strip of leather, similar to the welt in a Goodyear shoe, is placed around the top of the

extension edge. The outer sole is then tacked in position and the five thicknesses — outer sole, inner sole, lining, upper and welt — are sewn together with one seam. The welt serves the purpose of holding the stitches on top so that they cannot cut through the upper leather. In the days of the "fade-aways" this welt was not used; the result was that with every step taken by the soldier the heavy leather of the outer sole produced a strain on the stitches, causing the thread to cut its way through the lighter upper leather. The welt remedies this condition to some extent. It also adds to the appearance of the shoe, for if the welt were not there, the upper would flare outward at the sole line instead of appearing to turn under.

In recent years the stitch-down method has been limited principally to the making of children's sandals. For this purpose the lining is usually omitted. If both upper leather and sole leather are of good quality and fairly heavy so that the strength of one will not pull the stitches away from the other, the stitch-down shoe may be made to give reasonably good service. It is not, however, a thoroughly practical shoe and considerable effort is now being made to improve upon it.

CHAPTER XI

TREEING, PACKING AND SHIPPING

TIP REPAIRING

The entire process of making has now been considered; we have followed through each step of the manufacturing operation from the issuing of the original tags in the order department to the stamping of the trade mark on the sole or shank of the finished shoe. It remains now simply to consider the finishing touches of getting the shoe ready for the foot of the retail customer.

In most factories a special department is maintained for repairing toe tips that may have been damaged while the shoe was passing through the many processes of making. The toe of the shoe is at times likely to be marred during the lasting operation. The fact that there are several thicknesses of material to be pulled over the toe — the lining, the vamp (if it is not cut away) the box toe and the tip — makes the work difficult to perform without injury to the leather of the tip. This chance of damaging the toe is considerably increased in the case of patent leather shoes. If a shoe is made of calf or other similar leather, scratches, finger marks

and other scars can be easily eradicated by means of rubbing down or brushing. But the repairing of the varnished surface of patent leathers is much more difficult. If the scar is very noticeable, the old enamel or varnish is entirely removed with sandpaper, and a new coat of varnish is applied by hand. This is permitted to dry and is then polished to give a fresh, clear surface. A *tip-repairing* machine is sometimes used to do this work.

TREEING

In the making of Goodyear welt and turned shoes the wooden last has been allowed to remain in the shoe up to this point so that the leather would have ample time to acquire the desired shape. When the shoe arrives in the Treeing Department the last is removed and bottom linings or heel pads are pasted in place, if required. The shoe is then placed on the *treeing* machine. This machine has several revolving arms, and on each of these is a form resembling the last. These forms, however, are made so that they can be either expanded or contracted at the will of the operator. The shoe is placed over one of these forms and, by pressing a foot lever, the form is made to expand until it completely fills the shoe. The operator then removes any particles of dirt or any marks that may detract from the appearance of the leather. This is done sometimes by brushing and sometimes by wash-

ing with cleaning fluids, according to the quality and kind of leather.

Fine fabric shoes and also shoes made of very delicate shades of leather are made with covers of oiled paper or some similar material to protect them from damage. These covers are fastened in at the seams when the uppers and soles are attached. It is part of the work of the Treeing Department to remove the covers in such cases. This is a very trying operation because the cover must be cut away from the stitches without doing injury to the shoe. Skilled operators, however, perform this work very accurately and cleverly; cutting with a knife closely around the sole so that no trace of the cover remains visible.

When every defect has been removed from the upper leather, the shoe is *ironed* upon the tree until every wrinkle in the leather has been entirely rubbed out. This work of rubbing over with a warm or hot iron is very important because it is the last of the finishing operations and any wrinkle that is overlooked will probably remain in the shoe, unless it is noticed and returned by the inspector. (The inspection of the finished shoe will be discussed in the following chapter.) The shoe is now removed from the treeing machine by releasing the foot lever which causes the expanded form to collapse. Shoes that are to be used as samples or for display purposes in store windows, now have a beechwood form

placed in to preserve their shape. As we have already learned, this form resembles the last on which the shoe was originally made, but it is much lighter and more suitable for display purposes.

PACKING

When one recalls stories told by the older men in the trade, of the days when shoes were "sent to market" in barrels and sometimes not even packed to that extent but simply tied in bundles and loaded up in a cart, it is easier to appreciate the remarkable progress that has been made in the manner of packing shoes. This should be of special interest to the retail salesman, for much of his success in disposing of a shoe is dependent upon the freshness of its appearance. Nowadays, even the cheaper shoes are packed with some care, having tissue paper stuffing to protect them when placed in large boxes with other shoes. All medium and high grade shoes are packed in separate paste-board boxes or cartons.

Many of the larger shoe manufacturers have their own paper-box factories where the cartons are made and prepared for the packing department. Each box is labeled with the style, stock number, size, width, kind of leather and any other distinguishing information that may be called for by the individual dealer to whom the shipment is going.

In the packing room, the shoes are placed out on tables in pairs and by sizes. A final inspection is given to make sure that the pairs are properly mated. Cartons bearing the correct labels for each pair are then placed on the table beside the shoes. The packer compares the label on the box with the markings on the shoes before wrapping them carefully in tissue paper. Each pair is then placed in its carton in a position that permits the least amount of disturbance from rough handling on freight trains and the like. The cartons are securely packed in wooden or fibre cases, usually with thirty-six pairs to the case.

In packing goods for foreign trade, special cases are required. When American manufacturers first undertook the exporting of shoes they learned from bitter experience that the ordinary packing methods would not do for shipments to other countries. The cases must first of all be waterproof, for the chances are that the goods will be left on a wharf without a covering and, therefore, be exposed to rain and snow. But the cases must not only be rainproof; they must also be thief proof. "Pilfering" is still a common vice in countries where wharves are not under cover or guard. It often happens that a few boards of a case will be removed and the entire contents stolen, after which the thieves very carefully replace the boards so that the theft will not be discovered until the cases are de-

livered to the dealer. To protect their goods against this evil, exporting manufacturers are now using cases made with special waterproof linings, re-inforced with iron hoops.

SHIPPING

The large cases of shoes are sent from the packing room to the shipping department. Here in the larger factories we find the room sectioned off in *assembling aisles,* one for each letter of the alphabet. The shipping clerk receives a copy of each order as it is brought in by the salesman, so he knows in advance how many cases are coming through. If, for instance, the order is for Samuel Brown, then all the cases of shoes on that order are sent to aisle B when they come from the packing room. There the cases are "checked off" to make sure that the entire order is filled. If one case has been delayed in the factory, then the others wait for it at aisle B. If the cases come through ahead of time, that is, if they are ahead of the time specified on the original order, they are held in aisle B until the time for shipment arrives. The shipping clerk makes out bills-of-lading and these are sent forward with the cases to the freight office. The shipment is made so that the goods will arrive as nearly as possible to the date specified on the order.

Shipments for foreign parts require special attention and in some factories a separate ship-

ping department is maintained for exporting. Not only the bills-of-lading are much more involved but additional facts concerning weights and measures are also necessary.

When all the details of a shipment have been attended to, the clerk sends a complete report to the accounting department where all necessary charges are entered in the books.

CHAPTER XII

INSPECTION OF THE FINISHED SHOE

SALESMAN SHOULD INSPECT THE SHOE

It is just as important that the retail shoe salesman should know how to inspect a finished shoe as it is that he should know how it is made. In fact, it is only by careful inspection that he can pick out the "talking points" of each grade and style of shoes. Manufacturers exercise every possible precaution in the inspection of shoes so as to prevent the shipping of imperfect shoes to the retail trade. However, it must be recognized that human effort is not perfect and that consequently there is always the possibility that an imperfect shoe may slip by unnoticed. The retail salesman is the last to have a chance of catching the defective shoe before it goes to the customer and consequently he has the responsibility of being on the lookout. It is his job to check up the work of all of the others and make sure that the shoe measures up to the standard of quality set for it, and that the workmanship and finish is satisfactory.

Accordingly, every salesman, before he sells a shoe, ought to give it a quick survey and should

run his hand in it to make sure there are no creases or defects in the lining and also that there are no protruding ends of nails such as those that may sometimes remain in case a nail breaks while being withdrawn by the machine, after sewing of the sole.

ACTUAL CASE OF INSUFFICIENT INSPECTION

Not long ago an instance of the salesman's carelessness in inspection brought grief not only to the customer, but to the salesman, the retailer and finally the manufacturer. A retail salesman in the hurry of a busy day fitted a customer with a high grade welt shoe and suggested that he stamp his foot in the shoe and try walking in it. It happened that there was a nail protruding through the inner sole. The customer brought his foot down hard and, of course, drove the nail into his foot. The nail slanted forward so that when the salesman attempted to take off the shoe the nail was driven still farther into the foot. Finally the salesman had to cut the shoe the whole length of the upper in order to get it off.

As fate would have it, blood poisoning afterwards set in and the customer entered suit against the retailer. The retailer in turn passed the claim along to the manufacturer who, to avoid publicity, settled out of court for $5,000.00

Of course, the inspector in the factory should have discovered the nail. As a matter of fact,

in that particular factory there were a number of inspections, during any one of which the defect should have been discovered. Finally, the salesman before trying on the shoe should have given it a thorough final inspection and thus discovered the nail.

In this same way it is possible for other defects in shoemaking to get by the rigid factory inspection. Some of these defects are not as serious as the instance related above and would result only in unsatisfactory wear of the shoe. But bear in mind that a dissatisfied customer is a heavy expense, not only to the store but to the salesman himself. The loss of a customer's business means the loss of the most valuable possession the salesman can have. Do not risk losing it on such a small matter as that of inspecting the shoe before it is placed on the customer's foot.

PREPARING FOR THE CUSTOMER'S INSPECTION

Sometimes there may be slight defects in the shoe that can easily be remedied. For instance, in warm weather patent leather shoes may become dull. A bit of rubbing with a soft cloth will immediately restore the luster. In the same way calf shoes frequently take on a dullness which in the trade is known as a *bloom*, and this also can be removed with a bit of rubbing. No salesman should show a customer a first class shoe except in its very best condition. If *he* cannot

restore it at once to its perfect condition, the appearance of newness should be restored by special treatment in the store, or even by the manufacturer, before the shoe is displayed.

First of all it is to be understood that throughout the whole manufacturing process careful inspections are made at many of the important stages to trace down any defects and, if possible, have them corrected before the shoe or part passes on to the next operation. This plan of local inspection, or "crowning" as it often called, has the advantage of placing any responsibility for unsatisfactory work where it belongs and without delay. In this way it is possible to get at the cause and correct it before it has gone far enough to cause damage to any large part of the product. Then too, the fact that each operator is aware that his work is to be inspected has the effect of encouraging more careful workmanship. This, in turn, means a more nearly perfect product for the retail shoe salesman to offer his trade.

All of these local inspections are in addition to the final thorough inspection given after the shoe has been completed and is ready for shipment. In order that the salesman may be able to recognize the features of the shoe that require examination, we shall go through the final steps in the process of inspection, just as it is done in a high grade shoe factory.

The inspector generally puts out on the table a half dozen pairs of shoes and the specification

tag according to which the shoes were made. The first step is to compare the finished shoe with the data on the tag to make sure that the shoe meets the requirements. Every manufacturer who values the good-will of his customer maintains an efficient inspection system to make sure that all the specifications of the orders have been accurately followed. While it may not make any special difference to the retailer whether the decoration across the tip be of square perforations or round, yet the conscientious manufacturer will deliver exactly the shoe ordered — even down to the shape of the punchings in the toe cap. If any defect is found, a shoe is put aside and becomes a "reject" unless the defect is so small that it can be remedied. These rejects are sold to wholesalers who specialize on job lots.

The really important feature of the general inspection is that of making sure that the right materials were used and the required style followed. The first general survey of the shoe, therefore, includes an inspection of the leather, the lining and the workmanship. The standard of quality varies with the different grades of shoes. For instance, in a very high grade shoe if the upper leather shows fat wrinkles, the shoes become second quality, but in the medium grades these wrinkles may be allowed. In fact, it is by using a relatively lower priced leather such as one showing fat wrinkles that allows of the

shoe being sold at a low price. A fat wrinkle does not lower the wearing quality of the shoe but does have a slight effect on the appearance, for the reason that the leather at the point where the fat wrinkle lies will not take the same finish or polish as the rest of the leather.

INSPECTION STANDARDS FOR LEATHER

The standards for leather vary according to the part of the shoe for which it is to be used. The top requires a firm close-grained leather that will retain its shape. In the lower grades of shoes it is permissible to cut the top leather so that weak parts of the skin come along at the upper edge or along the front where the eyelets go, for these parts of the top are re-inforced by the facing.

The tongue of the shoe may be cut from an inferior quality of skin, as it is not exposed to severe wear and is practically covered from view. The vamps and toes should be of excellent quality of leather to withstand the strains and scuffing to which these parts of the shoe are subjected in wearing.

After the shoe is finished it is not possible to judge the quality of sole leather without cutting into it. However, an inspection of this nature is made in the factory while the shoe is in the process of making. At times an exception is made to this rule, generally in the case of turn shoes, when the sole is given a natural finish or

is buffed. When this method is used it is possible to see the grain of the leather and judge the quality after the manufacturing process has been completed.

The top lift of the heel should be of the same quality of sole leather as the sole itself. In the highest grade of shoes it is still customary to make the whole heel of leather — solid all through. This is, however, largely sentiment on the part of the manufacturer, for the reason that a composition leather will wear fully as well and is much lighter in weight. The factory inspector cannot tell whether the heel is all leather or partly leather board after it has been blackened or enameled. As in the case of sole leather, however, the material is inspected at the time of attaching.

INSPECTING THE WORKMANSHIP

After the inspector has checked up the materials of which the shoe is made and has judged the shape in comparison to the last, he then proceeds to a careful examination of the details of workmanship. The enamel or bottom finish should be even and free from cracks. Following this, an inspection of the edges is made. Shoe manufacturers have a dozen or more styles of edge trimming ranging from the very close trim to the wide extension. Welt shoes are frequently made to imitate the close edge of the turn shoe, while McKay shoes very often

take the appearance of the welt. Such points are always indicated on the order tag and the inspector must be sure that the correct trim has been given to the edge.

Before proceeding to the further inspection of the *making*, the shoes are matched up into pairs. This is to make certain that the rights and lefts which were intended by the cutter to go together are finally matched up and sold together. It should be understood that in cutting the various parts, the operator of the clicking machine tries to get similar pieces of leather into the same pair. The retail shoe salesman, in making his inspection, can check up in this same manner and prevent the possibility of selling two shoes as a pair that were not meant to go together or were improperly matched up through handling in stock.

In the case of tan shoes, especially, there is a possibility of the shoes not matching because skins vary to such a great extent, both in color and texture. Expert attention is given to the matching of leather in high-quality shoes. In the case of medium and low grade shoes the leather is not so accurately matched, and this too is one of the sources of saving that makes the less expensive grades possible.

After the shoes have been matched in pairs the inspection of workmanship is continued. The inspector places a pair of shoes evenly together in front of him so as to get a clear line of

vision down the front line of the shoe. First he mates up the tips to see that they are the same length and that they are properly placed in position across each shoe. It often happens as the result of flaws in the stitching operation that the tips are thrown out of alignment. In such a case the shoes become seconds.

The stitching of the toe cap is compared with the instructions to see that the desired number of rows of thread have been stitched. It is also necessary for the inspector to observe the stitches closely for possible breaks of the thread in the middle of a seam. The stitching around the top of a welted sole must be carefully examined to see that the proper sized thread and needle have been used. The thread should be coarse enough to completely fill the hole made by the needle, otherwise there will be a gap and, as a result of this, the thread may work loose.

VARIOUS STITCHING THREADS

Different parts of the shoe require different grades of thread for the sewing and stitching. It is part of the inspector's work to see that the correct thread has been used in the proper places. The thread should be equal in strength and wearing quality to the strain that is to be applied to each part of the shoe. For instance, the heel seam should have a very strong thread, usually a four cord silk-finished cotton thread or even a silk thread in certain qualities of shoes. A

smaller thread may be used if there are to be two or more rows of stitching. The vamp should be sewn to the top with a good strong thread, but not as heavy as that used for the heel seam. The parts of the top are usually stitched with a thread that runs from five to six sizes smaller than that used in the vamp. Of course, smaller thread can always be used where double rows of stitching occur, such as in the toe cap. Fancy stitching for purely ornamental purposes, such as that usually seen on a wing tip, may be done with a comparatively small-sized thread.

The length of the stitches is also to be considered. The heavier thread requires more space between stitches, For that reason the stitches on the seam at the back of the heel should be about fifteen or sixteen to the inch. Other seams may contain about twenty stitches to the inch in better grade shoes and about seventeen in medium and low grade goods. This scale is for men's shoes. A lighter thread is used in women's shoes, but with the same relative differences in stitching the various parts.

For attaching the soles, a nine or ten cord linen thread is used in men's shoes and a seven cord thread for women's shoes. Cotton thread is also extensively used for this purpose, but should be coarser to make up for the difference in tensile strength. In the McKay shoe good workmanship requires a six or seven cord thread for men's shoes. Concerning the qualities and

sizes of thread a complete statement is given in the volume on "Materials in Shoes."

INSPECTION FOR GENERAL APPEARANCE

After the details of workmanship have been carefully noted the inspector turns his attention to the general shape and outline of the shoe to see that it has been lasted properly. He looks for bunches or pleat wrinkles at the side of the toe. These may have been produced by a little extra fullness in the leather and may have escaped the attention of the laster at the time he was working on the shoe. The toe and vamp should conform exactly to the shape of the model last shown to the retailer at the time his order was placed.

During the two hundred or more operations through which a shoe often passes there are many chances for slight damages, such as the breaking of the thread in such a way that a little knot is often left on the seam. This does not affect the wearing quality of the shoe provided the thread has been properly spliced, but the appearance of the rough stitching is likely to offend the critical customer. In most shoe factories there is an expert workman whose job it is to take out the knotted stitches and then stitch over the seam in such a way that the thread will join perfectly.

The curves of the sole edge are the next feature to receive the inspector's attention. Some-

times the sole seam is permitted to gape a little at the vamp line; producing what is called a "grinning seam." The sole should, necessarily be smooth and tight against the upper. Another flaw in workmanship is one that produces a sort of a bunch along the edge of the sole just in front of the heel. This is due to carelessness in trimming around the breast of the heel at the edge of the sole and is likely to happen if the welt has not been cut off properly and inserted under the heel.

The curve of the edge of the sole must very accurately conform to the style of the shoe. In fact, the edge curve is often one of the chief factors in distinguishing one style from another. It is possible to spoil the style of a shoe completely by giving the wrong curve to the edge of the sole.

The next step in the inspection is to see that the shoe has been properly centered on the last. In some factories a machine called the *tip marking machine* is used to mark the point where the tip is to be attached to the vamp. However, in those cases where the vamp has been cut with a die the tip marking is automatically cut out by one of the notches in the die, as already illustrated. This insures centering the tip correctly with the *throat* of the vamp. The throat is the highest point of the vamp over the instep — the point at which the lower portion of the tongue is attached. It is very important that the throat be placed straight in line with the toe.

The shoe salesman has probably observed that the throat is usually stayed with a small piece of leather to give it strength. This reenforcement can usually be found by looking inside the shoe under the facing of the tongue. One of the causes of poor wearing quality in a shoe results from the breaking of the leather or thread at the throat. This breaking is generally the result of poor stitching. The operator has either failed to fit the leather evenly over the stitching machine or has crowded it when sewing around the vamp at the throat line. Or perhaps he has not fed it into the machine quickly enough, in which case the stitches would be too close together and as a result would cut through the leather.

SYMMETRY

In examining the shoe for symmetry, that is, to see that all parts have been joined together in correct alignment and have been properly drawn over the last, it is necessary to look at the shoe as a whole, rather than at individual parts. Lack of symmetry is sometimes the result of inexact workmanship in not following the pattern closely. Sometimes it results from the fact that the linings and the tops are not folded evenly enough so as to allow the two halves to meet as they should. Lack of symmetry is caused by failure to have the eyelets set evenly. For instance they might be placed too far from the

throat or perhaps, in other cases, too close. Sometimes one eyelet is a little higher than its mate on the opposite side.

Any one of these defects causes irregular tension across the throat and this throws the shoe out of alignment. Frequently the throat of a shoe is protected by a stitching of heavy thread just at the opening. This is called *Philadelphia barring*. The factory inspector exercises great care to see that this bar of thread is not sewn up too far. The effect of doing so would be to shorten the foot space in such a way that it becomes difficult for the wearer to put the shoe on. For this reason there is the likelihood of the stitch being broken when the last is pulled out of the shoe.

INSPECTION OF EYELETING

In the inspection of workmanship special attention is paid to the setting or clinching of the eyelets. They should be clinched so tightly in a shoe that it would be impossible to turn them around with the fingers. The clinching on the inside of the shoes should be fine and smooth. A rough surface in the clinching would result in tearing the stocking as well as cause the eyelets to loosen and perhaps come out.

If the eyeletting is to be of the "invisible" type an important matter to be considered is that of having the inside of the shoe strong enough to hold the eyelet. Also the outside

material of the shoe, whether leather or fabric, must be strong enough so that it will not tear out at the eyelet. The invisible eyelet affords no protection at all for the outside of the shoe around the eyelet. Consequently, if the leather or fabric is of poor quality the hole will easily pull out of shape and perhaps tear. For that reason the invisible eyelet, as has been previously suggested, should be used only in the better grades of shoes in which good strong leather or fabric is used.

In the case of fabric shoes, the fabric around the invisible eyelet is pretty sure to fray out if subject to much wear, even though the fabric be of the very best grade. For that reason it is doubtful whether invisible eyelets should ever be used in fabric shoes.

Sometimes an operator will make a mistake in spacing so that the eyelet in the leather on the outside of the shoe is not directly over the hole in the eyelet itself. This results in pulling the eyelet out of shape and frequently tearing it out altogether.

EXAMINATION OF THE HEEL

The bottom of the heel should be on a straight line with the ball of the foot. When the shoe is placed on a flat surface, the heel should rest on a perfect level without the slightest inclination to either side, nor to the front nor back. Both heels must be of exactly the same height.

The back seam or back stay, whichever happens to be used, must be on a perfectly straight up-and-down line. The heel seat, that is, the part supported by the counter, to which the heel is joined, should be symmetrical and should not bulge nor gape above the heel.

FINAL POINTS TO CONSIDER

The outer edge of the sole must be examined to see that the channel has been securely cemented down. Otherwise it will curl up at the edge and show the stitching; thus giving the shoe the appearance of careless workmanship. Another important feature of the inspection is that of examining to determine whether the operator in breasting the heel, has by any chance accidently cut into the sole. If the sole has been cut to any extent at this point it is likely to break after the sole has been put into service.

Wing tips and foxings or other decorative designs must be inspected to see that the proper curves and graceful designs have been maintained acording to the intention of the designer. The entire surface of the shoe must be examined to discover any unevenness in the finish. If one part of the shoe has been cut from coarse leather and another part from a much finer grade, these two parts will not finish evenly.

The rigid inspection given by the manufacturer, all along the line, will generally detect these things, and it is only in the exceptional

case that they come to the attention of the retail shoe salesman. Nevertheless, in the interest of expert shoe service it is for the salesman to be continually on the alert to detect an imperfect shoe before it gets into the hands of the customer. The responsibility of the last man to handle the goods is a *genuine* responsibility and must be so considered by the dealer and the salesman.

In the factory, after a final examination of the lining to make sure that there are no creases, and after the last inspection of the inner sole to make sure that there are no protruding nails, the shoe is sent forward to the packing department, and on from there to take its place on the dealer's shelves and finally on the customer's foot.

Just one last word on this subject: Before letting a pair of shoes out of the store make a careful comparison of the numbering marks on the lining of both shoes, to make certain that they are properly mated. They may have become mis-mated before arriving at your store. Or, more frequently, they may have become mismated from handling in stock. Compare the quality number, compare the style number and compare the markings for size and width.

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